NATIONAL ANNUAL DIESEL-FUEL SURVEY, 1956

BY O. C BLADE

* * * * * * * * * **Information Circular 7776**

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INTRODUCTION

Sales of diesel fuel in the United States during the past year and a half have increased greatly. In 1955 over 174 million barrels were sold of which 80 million (or 46 percent), were used by the railroads, and over 44 million barrels (25½ percent) of the fuel were used in trucks, busses, tractors, and heavy moving equipment. Vessels (12 percent), industry (9½), the military forces (4½), power plants (2), and oil companies (1/2 percent) account for the remainder. 2/ Daily deliveries of diesel type fuel from refineries averaged over 16,750 barrels during the first six months of 1956 in comparison with 15,250 barrels during the corresponding period of 1955. 3/

Information on the properties of diesel fuel is very important to the petroleum industry, engine manufacturers, and consumers. To supply such information the American Petroleum Institute and the Bureau of Mines, United States Department of the Interior, under cooperative agreement, are conducting annual surveys of diesel fuel oil produced in refineries in this country.

Samples of diesel fuel typical of their manufacture were analyzed by the refiners in accordance with instructions from the subcommittee on fuel surveys of the Automotive Research Committee of the American Petroleum Institute. Results of the analyses were transmitted to the Bureau of Mines, where the data were studied and compiled as shown in the tables of this report. Six surveys of diesel fuel made in this manner have been published as Bureau of Mines reports since 1950. 4/ This report shows the results of a survey made during 1956.

SUMMARY

In this survey 329 samples of diesel fuel are represented. The fuels were manufactured by 49 petroleum refining companies in 112 refineries, large and small, throughout the country. The data are divided into three groups according to grade of diesel fuel, and each group is subdivided into five tabulations according to the geographic marketing distribution of the various fuels represented. The three groups according to ASTM grades are as follows:

2/ Computed from figures in Bureau of Mines Mineral Market Report MMS 2517. Sales of Fuel Oil and Kerosine in 1955, 17 pp., compiled by A. T. Coumbe and I. F. Avery, 1956.

3/ Bureau of Mines, Crude Petroleum Products, Jan.-June 1956: Bureau of Mines Monthly Petroleum Statements 400-405, computed from table 2 in six reports.

4/ Blade, O. C., National Annual Diesel-Fuel Surveys, 1950-1955: Bureau of Mines Repts. of Investigations 4746, 1950, 25 pp.; 4830, 1951, 12 pp.; 4935, 1952, 22 pp.; 5008, 1953, 24 pp.; 5084, 1954, 24 pp.; and Inf. Circ. 7737, 1955, 24 pp. (In cooperation with the American Petroleum Institute).

(1-D) Diesel fuels of 625° F. maximum distillation end point; (2-D) diesel fuels of 675° F. maximum distillation temperature at 90 percent recovered and maximum kinematic viscosity at 100° F. of 5.8 centistokes (45 Saybolt Universal seconds), and (4-D) diesel fuels not conforming to the ASTM distillation-temperature or viscosity limitations of grade 1-D and 2-D fuels.

The geographic areas are five general regions of the country containing 14 districts in which the diesel fuels are marketed. The areas are shown on the map (fig. 1).

Summaries of the results of the tests by grades and by regions, compared with data for 1955, are shown in tables 1 through 3. Average values of selected properties are shown for the fuels represented, and minimum and maximum figures are given for all the tests indicated.

EXPLANATION OF TABLES AND FIGURES

Thirteen laboratory tests, selected by the subcommittee on fuel surveys of the Automotive Research Committee of the API and made by procedures approved by the American Society for Testing Materials, 5/ were used to analyze the samples of diesel fuel in this survey. By agreement with the cooperating agency, identification of the items is confidential.

Each item in tables 4 through 6 is a complete analysis of one sample of diesel fuel. The tables are arranged according to the following limitations,

ASTM grade	Table	Distillation temperature, ° F.	Kinematic viscosity at 100° F., centistokes
		Maximum	
1-D	4	End point, 625	--
2-D	5	90% point, 675	Maximum 5.8
4-D	6	--	Minimum 5.8

from table 1 of the latest ASTM classifications. 6/ This arrangement differs from the listing in preceding diesel-fuel survey reports in that grade 2-D fuels

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5/ American Society for Testing Materials, ASTM Standards, Part 5, Philadelphia, 1955, 1,460 pp.

6/ --------, Tentative Classification of Diesel Fuel Oils (D975-53T); ASTM Standards on Petroleum Products and Lubricants, Philadelphia, 1955, pp. 452-454.

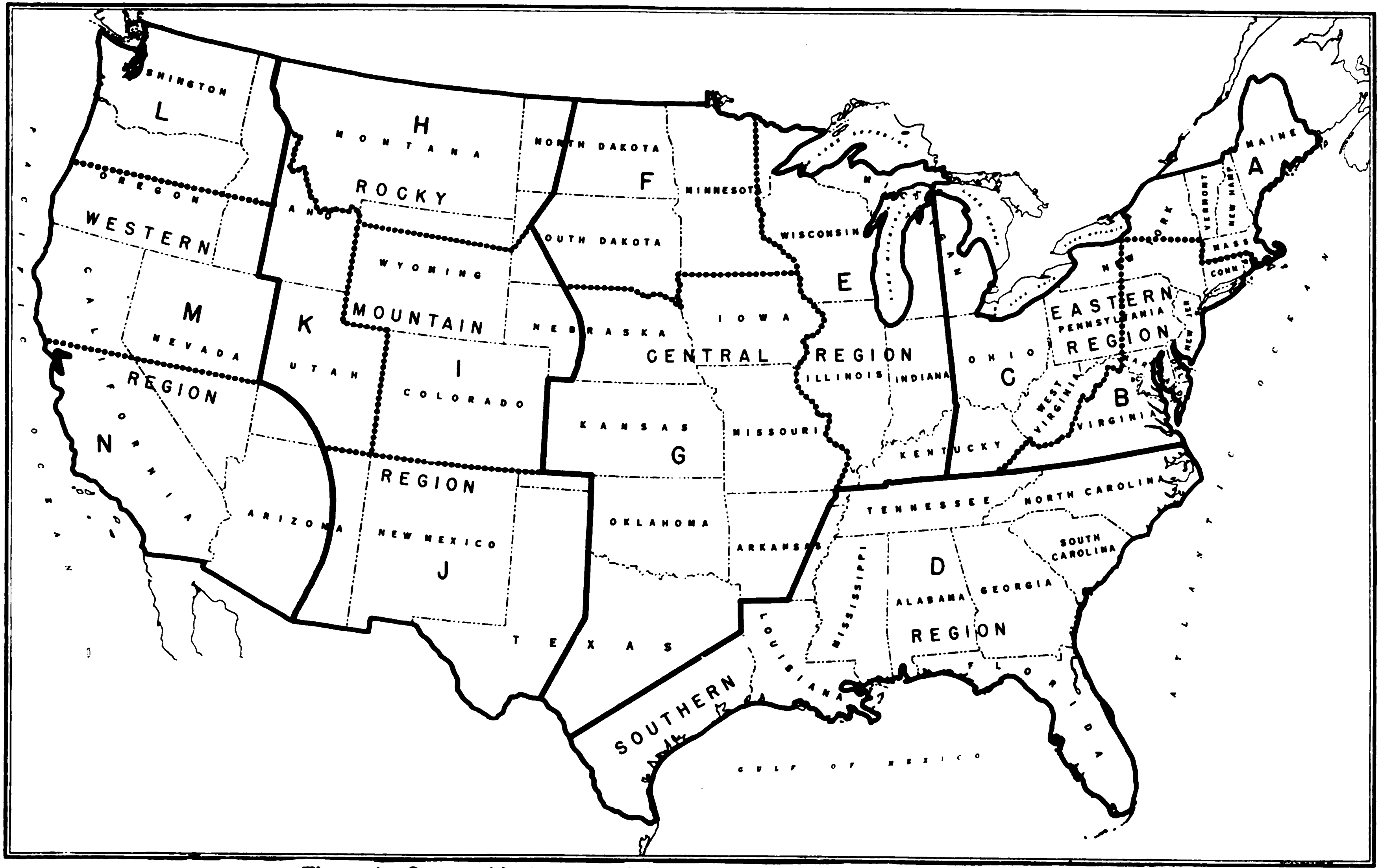

Figure 1.–Geographical areas of National Annual Diesel-Fuel Survey.

TABLE 1.--Summary of grade 1-D fuels

Diesel fuel survey, 1956

Geographic distribution of diesel fuels 1/ Districts within region Additional districts 2/ Number of fuels				Eastern region A, B, C D, E, F, G 74			Southern region D A, B, C, E, F, G, J 28			Central region E, F, G A, B, C, D, H, I, J, K, L 95			Rocky Mountain region H, I, J, K D, E, F, G, L, M 42			Western region L, M, N F, H, I, K 17		
	ASTM D975 requirements																	
Test	Method	Min.	Max.	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
Gravity ° API	D287	-	-	28.0	40.5	47.6	32.4	40.1	44.5	28.0	39.6	45.6	33.8	40.4	45.4	36.5	40.8	44.2
Flash point, P-M closed tester ° F.	D93	100	-	126	-	210	126	-	186	122	-	215	122	-	212	134	-	188
Color:																		
ASTM Union colorimeter	D155	-	-	< 1	-	2½	< 1	-	2	< 1	-	3	< 1	-	1½	< 1	-	1½
Saybolt chromometer	D156	-	-	+30	-	-14	+30	-	-14	+30	-	-14	+30	-	+3	+30	-	+3
Viscosity at 100° F.:																		
Kinematic centistokes	D445	1.4	-	<1.35	2.11	3.44	1.50	2.06	3.36	1.4	2.22	3.79	1.4	2.13	3.02	1.46	1.91	2.80
Saybolt Universal seconds	D88	-	-	30.0	33.0	37.5	-	32.8	37.2	31.2	33.4	38.5	-	33.1	36.1	-	32.3	35.4
Cloud test ° F.	D97	-	-	-60	-	22	-55	-	5	-60	-	30	-54	-	20	-54	-	-3
Pour point do	D97	-	-	-70	-	15	-55	-	0	-70	-	10	-55	-	5	-60	-	-15
Sulfur content wt. percent	D129	-	0.50	0.020	0.142	0.75	0.02	0.090	0.26	0.014	0.184	0.68	0.01	0.226	0.780	0.008	0.184	.60
Aniline point ° F.	D611	-	-	112.6	150.2	172	134.4	149.7	164	116.3	149.0	194.8	134	149.3	163	132	146.9	163
Ramsbottom carbon residue																		
on 10 percent residuum percent	D524	-	0.15	0.00	0.076	0.19	0.00	0.070	0.15	0.02	<0.085	0.21	0.00	<0.067	0.12	0.02	0.069	0.10
Ash do	D482	-	0.01	0.000	0.001	0.005	0.000	0.001	0.005	0.000	0.001	0.004	0.000	0.000	0.004	0.000	0.002	0.009
Corrosion, 3 hours at 122° F. 3/	D130	-	No. 3															
Cetane number	D613	40	-	36	51.3	60	43.8	50.3	58	36	50.5	58	43.8	50.2	57.7	43	48.6	52
Distillation test,																		
on volume recovered basis:	D86																	
Initial boiling point ° F.		-	-	322	364	442	330	360	418	310	366	456	310	365	451	320	354	411
10 percent		-	-	360	408	484	369	407	460	348	414	507	348	410	495	372	401	458
50 percent		-	-	412	460	526	412	458	520	376	469	543	376	458	527	412	447	508
90 percent		-	-	456	524	586	460	519	586	437	533	592	437	520	583	470	507	570
End point		-	625	478	567	625	497	562	624	500	575	624	499	564	625	509	552	613

Diesel fuel survey, 1955 4/

Geographic distribution of diesel fuels 1/ Districts within region Additional districts 2/ Number of fuels				Eastern region A, B, C D, E, F, G 63			Southern region D A. B, C, E, F, G, J 24			Central region E, F, G A, B, C, D, H, I, J, K 95			Rocky Mountain region H, I, J, K D, E, F, G, L, M, N 41			Western region L, M, N H, K 14		
	ASTM D975 requirements																	
Test	Method	Min.	Max.	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
Gravity ° API	D287	-	-	25.7	40.9	48.4	33.3	40.5	44.6	25.7	39.9	45.7	33.0	40.5	45.1	37.4	40.9	43.8
Flash point, P-M closed tester ° F.	D93	100	-	114	-	220	130	-	188	125	-	220	117	-	210	132	-	170
Color:																		
ASTM Union colorimeter	D155	-	-	1	-	2½	1	-	2½	1	-	5	1	-	1½	1	-	2
Saybolt chromometer	D156	-	-	+30	-	-5	+30	-	1	+30	-	-5	+30	-	1	+30	-	1
Viscosity at 100° F.:																		
Kinematic centistokes	D445	1.4	-	1.40	2.02	3.17	1.49	1.96	2.79	1.49	2.18	3.34	1.47	2.15	3.34	1.47	1.96	3.02
Saybolt Universal seconds	D88	-	-	30.4	32.7	36.6	-	32.5	35.4	-	33.3	37.1	-	33.2	37.1	-	32.5	36.1
Cloud test ° F.	D97	-	-	-60	-	12	-48	-	5	-60	-	8	-50	-	10	-56	-	0
Pour point do	D97	-	-	-70	-	5	-55	-	0	-70	-	5	-60	-	0	-65	-	-5
Sulfur content wt. percent	D129	-	0.50	0.027	0.148	1.00	0.016	0.115	0.46	0.016	0.183	0.64	0.018	0.207	0.64	0.01	0.198	0.50
Aniline point ° F.	D611	-	-	102.0	149.4	168.8	135	147.8	164	102.0	148.8	166	117	150.1	166	134.5	149.4	161
Ramsbottom carbon residue																		
on 10 percent residuum percent	D524	-	0.15	0.00	0.081	0.30	0.00	0.075	0.17	0.008	0.085	0.30	0.004	0.070	0.12	0.01	0.061	0.09
Ash do	D482	-	0.01	0.000	0.000	0.008	0.000	0.000	0.001	0.000	0.000	0.004	0.000	0.000	0.002	0.000	0.001	0.002
Corrosion, 3 hours at 122° F.	D130	-	No. 3															
Cetane number	D613	40	-	33	51.0	60.0	45.0	50.0	58	33	50.4	58.5	43.8	51.1	57	46	49.5	53
Distillation test,																		
on volume recovered basis:	D86																	
Initial boiling point ° F.		-	-	314	356	435	330	355	402	320	362	453	330	365	453	334	361	396
10 percent		-	-	354	401	489	355	399	450	350	407	491	350	409	491	370	403	442
50 percent		-	-	392	454	537	415	451	524	394	464	537	394	460	522	409	448	522
90 percent		-	-	453	521	591	468	517	588	457	532	592	462	524	584	465	504	584
End point		-	625	502	567	625	502	557	622	501	575	625	496	570	625	496	548	625

1/ Regions and districts are shown on map (Fig. 1).
2/ Some of the fuels are sold in districts of more than one region.
3/ Corrosion test results, by ASTM D130, are not summarized but may be inspected in table 4.
4/ This summary of diesel fuel oils of 1955 differs from that shown in IC 7737 in that several figures not meeting the requirements of fuels of this grade were omitted from the computations but are now included similar to the data for 1956.

TABLE 2.--Summary of grade 2-D fuels

Diesel fuel survey, 1956

Geographic distribution of diesel fuels 1/ Districts within region Additional districts 2/ Number of fuels				Eastern region A, B, C D, E, F, G 48			Southern region D A, B, C, E, F, G, J 31			Central region E, F, G A, B, C, D, H, I, J, K, L 60			Rocky Mountain region H, I, J, K D, E, F, G, L, M, N 41			Western region L, M, N E, F, G, H, I, K 36		
Test	ASTM D975 requirements																	
	Method	Min.	Max.	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
Gravity ° API	D287	-	-	29.4	36.8	45.0	28.6	35.8	40.1	28.6	35.9	41.7	28.6	35.4	39.8	26.9	33.5	39.8
Flash point, P-M closed tester ° F.	D93	125	-	138	-	215	140	-	204	143	-	215	143	-	200	154	-	230
Color, ASTM Union colorimeter	D155	-	-	<1	-	3	<1	-	3½	<1	-	5	<1	-	5	<1	-	4
Viscosity at 100° F.:																		
Kinematic centistokes	D445	1.8	5.8	2.07	2.69	3.95	2.35	2.86	3.95	2.07	2.87	4.58	2.11	3.09	4.58	2.11	3.30	4.3
Saybolt Universal seconds	D88	32.0	45	32.9	35.0	39.0	33.9	35.6	39	32.9	35.6	41.0	33.0	36.3	41.0	33.0	37.0	40
Cloud test ° F.	D97	-	-	<-10	-	20	-50	-	25	-50	-	25	-18	-	25	-18	-	26
Pour point do	D97	-	-	-25	-	15	-90	-	15	-90	-	15	-25	-	20	-25	-	25
Sulfur content wt. percent	D129	-	1.0	0.06	0.273	0.70	0.07	0.312	0.80	0.07	0.285	0.80	0.085	0.480	1.06	0.130	0.523	1.00
Aniline point ° F.	D611	-	-	127	150.4	178	129.0	150.6	170	118.7	148.6	170	121	146.9	166.6	112.8	143.0	162
Ramsbottom carbon residue																		
on 10 percent residuum percent	D524	-	0.35	0.022	0.106	0.31	0.04	0.112	0.21	0.03	0.100	0.220	0.04	0.083	0.145	0.06	0.112	0.35
Ash do	D482	-	0.02	0.000	0.001	0.005	0.000	0.001	0.005	0.000	0.001	0.010	0.000	0.002	0.010	0.000	0.001	0.008
Corrosion, 3 hours at 122° F. 3/	D130	-	No. 3															
Cetane number	D613	40	-	40.7	50.3	63.0	40	50.1	58	34.3	49.5	59.0	37.6	49.0	56.3	32	45.7	52.4
Distillation test,																		
on volume recovered basis:	D158																	
Initial boiling point ° F.		-	-	312	369	442	312	374	440	326	375	442	334	386	430	342	387	440
10 percent		-	-	372	431	494	390	440	500	372	438	500	394	447	503	408	455	490
50 percent		-	-	440	502	550	472	511	580	457	509	580	460	513	560	469	522	560
90 percent		-	675	530	587	654	558	589	632	542	590	632	562	596	635	552	606	650
End point		-	-	626	645	710	626	644	684	626	645	684	628	654	699	628	668	715

Diesel fuel survey, 1955 4/

Geographic distribution of diesel fuels 1/ Districts within region Additional districts 2/ Number of fuels				Eastern region A, B, C D, E, F, G 55			Southern region D A, B, C, E, F, G, J 32			Central region E, F, G A, B, C, D, H, I, J, K 47			Rocky Mountain region H, I, J, K D, E, F, G, L, M, N 28			Western region L, M, N H, I, K 29		
Test	ASTM D975 requirements																	
	Method	Min.	Max.	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
Gravity ° API	D287	-	-	17.6	36.1	44.8	17.6	35.3	39.7	17.6	36.1	40.6	22.9	35.5	40.1	22.9	33.4	38.8
Flash point, P-M closed tester ° F.	D93	125	-	126	-	240	140	-	240	146	-	240	150	-	218	154	-	230
Color, ASTM Union colorimeter	D155	-	-	1	-	4½	1	-	4½	1	-	4½	1	-	3½	1	-	4½
Viscosity at 100° F.:																		
Kinematic centistokes	D445	1.8	5.8	2.09	2.77	4.39	2.30	3.00	4.58	2.10	2.97	5.51	2.77	3.09	4.05	2.13	3.35	4.3
Saybolt Universal seconds	D88	32.0	45	33.0	35.3	40.4	33.7	36.0	41.0	33.0	35.9	44	35.3	36.3	39.3	33.1	37.2	40.0
Cloud test ° F.	D97	-	-	-12	-	26	-5	-	14	-50	-	26	-22	-	40	-22	-	18
Pour point do	D97	-	-	-40	-	20	-15	-	15	-85	-	15	-30	-	15	-30	-	15
Sulfur content wt. percent	D129	-	1.0	0.03	0.264	0.70	0.05	0.279	0.78	0.05	0.280	0.78	0.12	0.484	0.97	0.28	0.549	0.97
Aniline point ° F.	D611	-	-	62.0	147.7	177.8	62.0	147.8	169	62.0	150.7	169.5	70	147.6	167	70	142.6	155
Ramsbottom carbon residue																		
on 10 percent residuum percent	D524	-	0.35	0.01	0.120	0.34	0.01	0.106	0.29	0.04	0.112	0.32	0.008	0.089	0.20	0.06	0.103	0.20
Ash do	D482	-	0.02	0.000	0.001	0.006	0.000	0.001	0.006	0.000	0.001	0.005	0.000	0.001	0.006	0.000	0.001	0.006
Corrosion, 3 hours at 122° F.	D130	-	No. 3															
Cetane number	D613	40	-	25	49.8	62.9	25	50.0	60.0	25	50.0	60.0	23.6	48.9	56.3	23.6	44.9	51.5
Distillation test,																		
on volume recovered basis:	D158																	
Initial boiling point ° F.		-	-	318	370	472	327	376	472	330	375	472	346	395	457	350	389	434
10 percent		-	-	372	434	506	410	442	506	389	441	506	398	454	503	409	457	500
50 percent		-	-	461	508	553	468	515	580	482	515	580	471	515	558	471	523	560
90 percent		-	675	556	592	650	569	594	670	520	595	648	520	593	653	529	606	644
End point		-	-	626	647	706	627	654	808	626	651	770	626	655	720	630	670	720

1/ Regions and districts are shown on map (Fig. 1).

2/ Some of the fuels are sold in districts of more than one region.

3/ Corrosion test results by, ASTM D130, are not summarized by may be inspected in table 5.

4/ This summary of diesel fuel oils of 1955 differs from that shown in IC7737 in that grade 2-D fuels are not separated into two groups according to high or low pour point but have been combined and the data averaged by the numbers of samples represented. Several figures not meeting the requirement of fuels of this grade were omitted from the computations but are now included similar to the data for 1956.

TABLE 3.--Summary of grade 4-D fuels

Diesel fuel survey, 1956

Geographic distribution of diesel fuels 1/				Eastern region			Southern region			Central region	Rocky Mountain region			Western region		
Districts within region				B, C			D			E				N		
Additional districts 2/				D, E			B			C	(No analyses of grade 4-D fuels)			-		
Number of fuels				5			7			1				3		
	ASTM D975 requirements															
Test	Method	Min.	Max.	Minimum	Average	Maximum	Minimum	Average	Maximum	(Data on 1 sample)	-	-	-	Minimum	Average	Maximum
Gravity ° API	D287	-	-	22.5	28.8	33.0	26.8	30.2	33.0	28.3	-	-	-	17.4	20.6	27.1
Flash point, P-M closed tester ° F.	D93	130	-	156	-	273	170	-	240	273	-	-	-	174	-	200
Color, ASTM Union Colorimeter		-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
Viscosity at 100° F.:																
Kinematic centistokes	D445	5.8	26.4	5.20	6.29	7.83	4.89	5.60	6.68	7.83	-	-	-	9.4	43.4	64.0
Saybolt Universal seconds	D88	45	125	43	46.5	51.5	42.0	44.3	47.8	51.5	-	-	-	57	201.7	296.7
Cloud test ° F.	D97	-	-	-	-	-	-	-	-	44	-	-	-	-	-	-
Pour point do	D97	-	-	-20	-	40	-15	-	10	40	-	-	-	-35	-	10
Sulfur content wt. percent	D129	-	2.0	0.12	0.39	1.00	0.12	0.33	0.6	0.25	-	-	-	0.97	1.30	1.82
Aniline point ° F.	D611	-	-	120.0	150.7	163.8	152.2	157.4	163.8	161.6	-	-	-	115	119	123
Ramsbottom carbon residue:	D524															
on 10 percent residuum percent	D524	-	-	-	-	-	-	3/0.12	-	-	-	-	-	1.1	4.17	6.1
on 100 percent sample do		-	-	0.07	0.50	0.98	0.01	0.01	0.98	0.143	-	-	-	<0.01	<0.023	.04
Ash do	D482	-	0.10	0.000	0.003	0.010	0.001	<0.006	<0.02	0.000	-	-	-	-	-	-
Corrosion, 3 hours at 122° F. 4/	D130	-	No. 3													
Cetane number	D613	30	-	28	47.2	60	40.0	48.2	59	60	-	-	-	-	-	-
Distillation test,																
on volume recovered basis:	D158															
Initial boiling point ° F.		-	-	378	451	560	338	397	462	560	-	-	-	-	3/ 362	-
10 percent		-	-	453	511	602	453	486	512	602	-	-	-	455	459	463
50 percent		-	-	558	582	636	558	578	610	636	-	-	-	602	628	654
90 percent		-	-	672	720	770	690	706	739	672	-	-	-	-		-
End point		-	-	708	780	888	744	>772	812	708	-	-	-	-	3/1025	-

Diesel fuel survey, 1955

Geographic distribution of diesel fuels 1/				Eastern region			Southern region			Central region	Rocky Mountain region			Western region		
Districts within region				B, C			D			E				N		
Additional districts 2/				E			-			C	(No analyses of grade 4-D fuels)			-		
Number of fuels				6			5			1				3		
	ASTM D975 requirements															
Test	Method	Min.	Max.	Minimum	Average	Maximum	Minimum	Average	Maximum	(Data on 1 sample)	-	-	-	Minimum	Average	Maximum
Gravity ° API	D287	-	-	22.6	27.3	33.3	26.5	29.1	31.8	24.2	-	-	-	17.4	20.6	27.1
Flash point, P-M closed tester ° F.	D93	130	-	160	-	230	178	-	255	180	-	-	-	174	-	194
Color, ASTM Union colorimeter		-	-	-	-	-	-	-	-	(Black)	-	-	-	-	-	-
Viscosity at 100° F.:																
Kinematic centistokes	D445	5.8	26.4	7.09	15.94	35.3	5.83	11.77	34.0	18.72	-	-	-	7.37	42.7	63.8
Saybolt Universal seconds	D88	45	125	49.1	81.1	165.1	45.0	65.2	159.0	92.4	-	-	-	50.0	198.5	295.8
Cloud test ° F.	D97	-	-	24	-	34	-	-	-	-	-	-	-	-	-	-
Pour point do	D97	-	-	-15	-	35	-5	-	45	15	-	-	-	-35	-	10
Sulfur content wt. percent	D129	-	2.0	0.30	0.577	1.09	0.17	0.416	0.74	0.820	-	-	-	0.97	1.31	1.79
Aniline point ° F.	D611	-	-	117.2	163.0	182.9	153	158.9	164.5	-	-	-	-	118	128.7	145
Ramsbottom carbon residue:	D524															
on 10 percent residuum percent		-	-	0.24	0.77	1.80	-	3/0.12	-	-	-	-	-	-	-	-
on 100 percent sample do		-	-	.10	1.48	3.72	0.01	0.72	1.66	3.72	-	-	-	1.06	4.12	6.1
Ash do	D482	-	0.10	0.000	0.015	0.082	0.000	0.003	0.005	0.082	-	-	-	0.005	0.018	0.03
Corrosion, 3 hours at 122° F.	D130	-	No. 3													
Cetane number	D613	30	-	34	(5)	38.0	40.0	42.3	45	-	-	-	-	-	3/39.5	-
Distillation test,																
on volume recovered basis:	D158															
Initial boiling point ° F.		-	-	351	398	457	358	402	438	-	-	-	-	366	383	400
10 percent		-	-	447	500	549	460	499	538	-	-	-	-	458	464	472
50 percent		-	-	534	622	695	570	625	694	-	-	-	-	555	605	658
90 percent		-	-	716	728	748	690	(5)	706	-	-	-	-	-	3/ 730	-
End point		-	-	718	773	842	-	3/>760	-	-	-	-	-	-	3/>760	-

1/ Regions and districts are shown on map (fig. 1).
2/ Some of the fuels are sold in districts of more than one region.
3/ Result of test on one sample only.
4/ Corrosion test results, by ASTM D130, are not summarized but may be inspected in table 6.
5/ No average was determined as only two samples are represented.

are not separated according to pour points--0° F. and below or 5° F. and above. Each group of data is subdivided into five tabulations according to the geographic marketing distribution of the fuels represented. The geographic areas are made up of five general regions divided into 14 marketing districts as follows:

Region	Districts
Eastern	A, B, C
Southern	D
Central	E, F, G
Rocky Mountain	H, I, J, K
Western	L, M, N

The regions and districts are indicated in figure 1. These areas were established by a study committee of the API and are based on fuel-distribution systems, refinery locations, centers of population, temperature zones, and arteries of commerce, such as navigable waters. The districts differ from those of the 1950 diesel-fuel survey, which were the same as those used for the motor-gasoline surveys. [7]

The data in tables 4 through 6 are arranged, within each grade group, according to the regions where the fuels are sold. In each regional tabulation the districts where each fuel is sold are given in the fourth column. The listing of the districts indicates in decreasing order the relative volume of sales for each fuel. Thus, the first district listed is that in which the greatest volume of a fuel is sold, and the analysis of this fuel is tabulated in the first section of data under the region containing that district. The second section of data, separated by a line from the first section, contains analyses of fuels that are sold in greatest volume in districts of other regions. The first section of data in each regional tabulation might be considered to represent fuels of major distribution and the second section to represent fuels of minor distribution for that particular region. It is possible that the sales volume of a given fuel may be highest in a district of one region but that the total sales in districts of another region may be greater. Consider, for example, a fuel distributed in districts C, E, and F. The greatest sales volume might be in district C of the Eastern region, but the combined sales in districts E and F of the Central region could be higher. This fuel would be listed as a fuel of major distribution in the Eastern region and as a fuel of minor distribution in the Central region. It is believed, however, that in most cases the region of greatest sales volume will contain the district of greatest sales volume.

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[7] Blade, O. C., National Motor Gasoline Survey, Winter 1955-56: Bureau of Mines Inf. Circ. 7763, 1956, 26 pp. (In cooperation with the American Petroleum Institute).

The second column indicates the class or classes of service for which the fuels are recommended by the manufacturers as follows:

Class 1. Diesel fuel oils for city-bus and similar operation
Class 2. Fuels for diesel engines in trucks, tractors, and similar service
Class 3. Fuel for railroad diesel engines
Class 4. Heavy-distillate and residual fuels for large stationary and marine diesel engines

Analyses by class or service have not been tabulated in this survey.

In some instances a fuel has been designated for use during the summer or winter season only. The letter (S) or (W) in parenthesis following the class designation indicates the summer or winter season, respectively. Some of the contributing companies indicated that their diesel fuels also are frequently sold as burner-fuel oils. The ASTM grade numbers of these burner-fuel oils are listed in the third column of the tables.

The column headings for the data show the primary ASTM designations of the test procedures. If a test was made by another procedure, the exception is indicated with a footnote. Colors of 1-D fuels were determined by the Saybolt chromometer nearly as often as with a Union colorimeter. Therefore, a column has been included in table 4 to indicate Saybolt color. Viscosities of some samples were determined both in centistokes and in Saybolt Universal seconds. For the majority of the samples, however, the results were determined by one method. Conversions were made to the kinematic value for all the Saybolt figures given and to Saybolt seconds for all kinematic values of 1.83 centistokes and over. The equivalent values were secured from the amplified ASTM conversion tables 8/ and, for several Saybolt figures below 32.0 seconds, from a correlation derived from determinations reported by both methods in the diesel-fuel surveys.

Properties, other than distillation temperature or viscosity, of some fuels that do not meet the specification requirements are included in the averages but are footnoted to indicate they are outside the limitations. Some results for the following determinations are so marked: Percent sulfur, percent carbon residue, cetane number, and for several grade 4-D fuels, viscosity. For a fuel for which no cetane number was reported its calculated cetane index is given

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8/ American Society for Testing Materials, ASTM Viscosity Tables for Kinematic Viscosity Conversions and Viscosity Index Calculations: ASTM Special Technical Publication No. 43A, Philadelphia, July 1953, 56 pp.

and footnoted as such. This value is based on correlations of API gravities and mid-boiling points of numerous diesel fuels with their cetane numbers and was secured from a nomograph. [9] Sometimes a calculated cetane index figure, such as in items 250 and 251 in table 5, is quite low and possibly should be footnoted as not meeting the requirement of fuels of its grade. However, had the cetane numbers of these samples been determined it is quite probable they would be higher and within the limitation because of additives now in use. Distillation data are shown by ASTM Method D86 for the 1-D diesel fuels and by ASTM D158 for the heavier grade fuels.

Average values of eight selected characteristics of all the diesel fuels indicated in each of tables 4 through 6 have been computed where possible and are shown at the ends of the respective tables. Averages are not given for flash point, color, cloud test, pour point, and corrosion. Minimum and maximum figures are shown for all the properties except corrosion. The small number of grade 4-D fuels (table 6) is inadequate to represent that grade statistically, and it is possible that average, minimum, and maximum figures could be changed appreciably by more analyses of fuels of that grade.

Summaries of the results of this survey are shown with similar summaries of the results of the survey for the preceding year in tables 1, 2, and 3.

Figures 2 and 3 show the trends of averages of some properties of grades 1-D and 2-D diesel fuels represented in the surveys since 1950. Plots of data appear for kinematic viscosity at 100° F., sulfur content, cetane number, and distillation temperatures at the 10 percent point, 90 percent, and end points. The charts are based on the numbers of samples represented in the summary tables in the present and past reports for the country as a whole.

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[9] American Society for Testing Materials, Tentative Classification of Diesel Fuel Oils (D975-53T), Appendix 2, Calculated Cetane Index: ASTM Standards on Petroleum Products and Lubricants, Philadelphia, 1955, pp. 455-457.

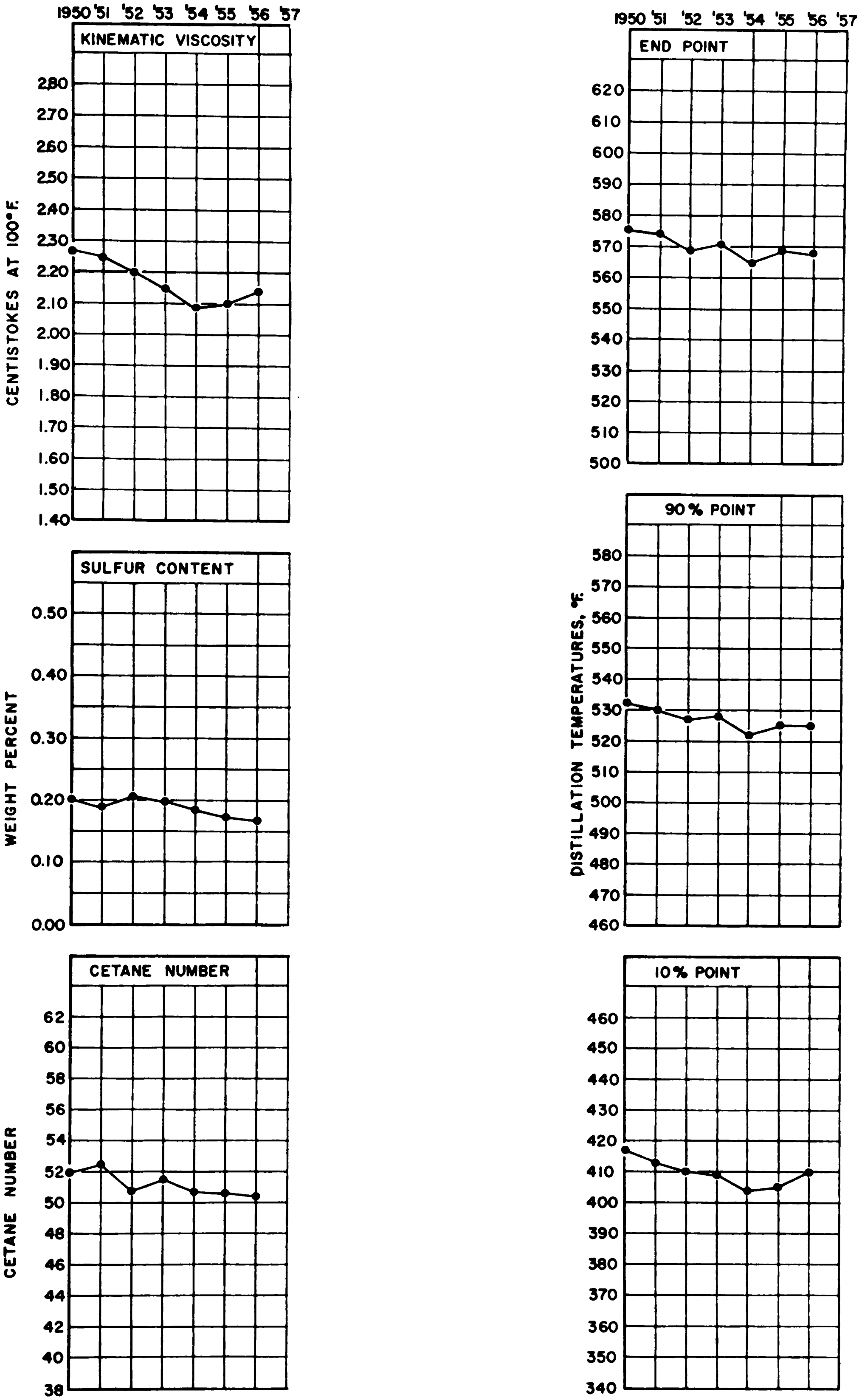

Figure 2. - Trends of some properties of grade 1-D diesel fuels.

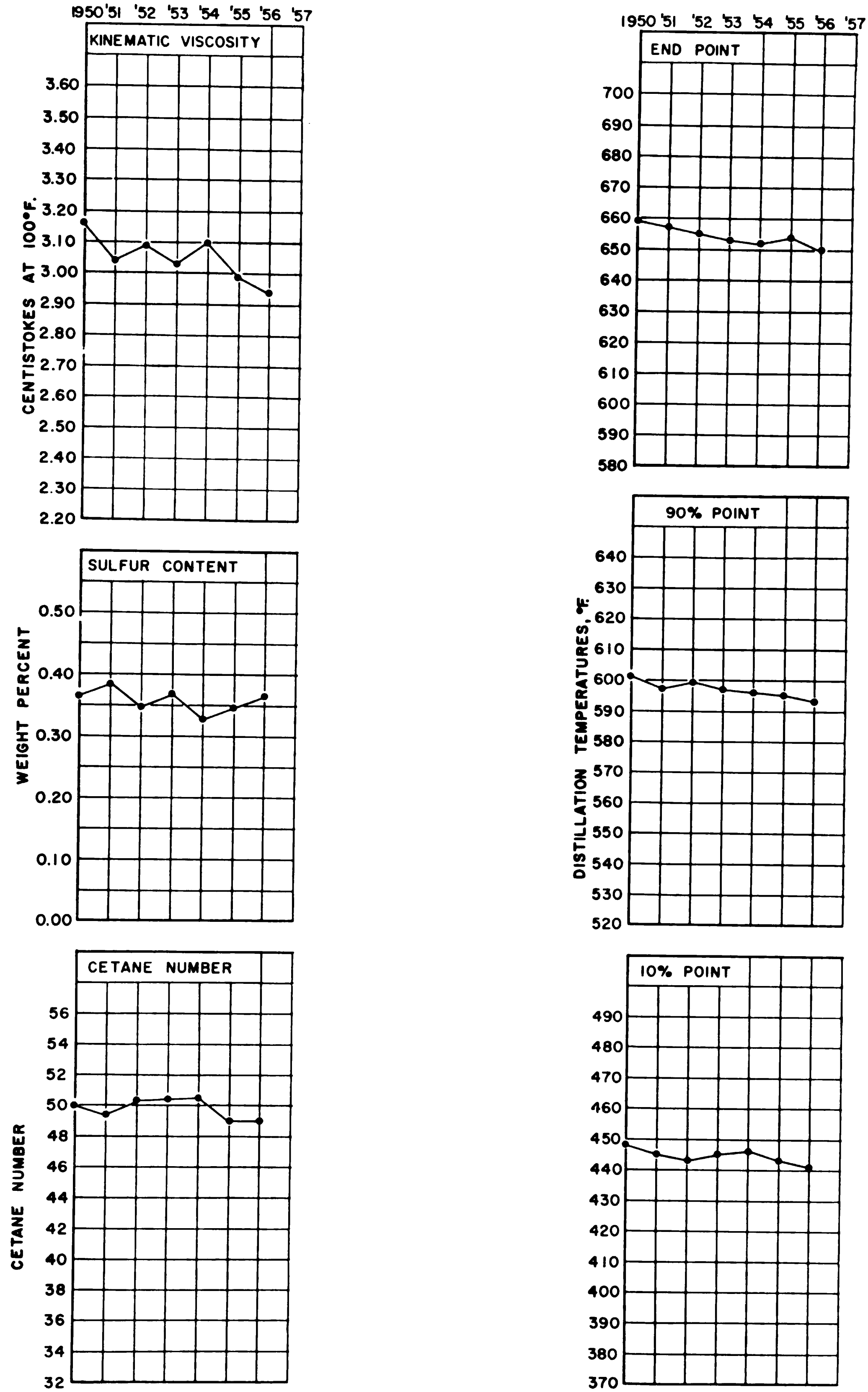

Figure 3.-Trends of some properties of grade 2-D diesel fuels

TABLE 4.--Analyses of grade 1-D diesel fuel oils, 1956

Item	Marketed as: Diesel fuel oil, class 1/	Marketed as: Burner fuel oil ASTM D396 Grade	Distributed in districts 2/	Gravity ASTM D287 ° API	Flash point ASTM D93 ° F.	Color Union ASTM D155 No.	Color Saybolt ASTM D156 No.	Viscosity at 100° F. 3/ Kinematic ASTM D445 Cs.	Viscosity at 100° F. 3/ Saybolt ASTM D88 Sec.	Cloud test ASTM D97 ° F.	Pour point ASTM D97 ° F.	Sulfur content ASTM D129 wt. percent	Aniline point ASTM D611 ° F.	Carbon Res. 4/ ASTM D524 on 10% Res., %	Corrosion ASTM D130 5/ 3 hours at 122° F. and 212° F.	Ash ASTM D482 percent	Cetane number ASTM D613	Distillation 6/ ASTM D86 Temperature ° F. % recovered IBP	10	50	90	End point
Eastern region: Districts A, B, and C																						
1	1, 2	1	A, D, B	41.5	135	-	+27	1.7	-	<-20	<-25	0.04	-	0.07	1, -	<0.01	49	340	375	425	500	530
2	1, 2	1	A, D, B	42.2	132	-	+26	1.6	-	-55	-50	.02	-	.04	1, -	< .01	46	337	376	422	473	508
3	3	-	B	30.0	210	2	-	2.28	33.6	-18	-15	7/ .75	112.6	.121	1, 1	.000	7/ 38.5	432	462	486	542	591
4	1	1	B	42.3	136	-	+25	1.88	32.2	-30	-45	.03	-	< .01	-, 1	< .001	49	333	369	420	492	540
5	1	-	B	40.4	146	< 1½	-	1.94	32.4	-15	-25	.14	-	.06	-, 1	< .001	50	348	400	456	537	592
6	2, 4	2	B	36.0	160	1½	-	2.99	36.0	10	0	.4	-	-	-, -	-	48	350	420	485	565	612
7	1	1	B	44.8	140	< 1	+22	1.67	-	-28	-30	.10	154.1	.07	1, 1	< .001	58	354	382	430	488	521
8	3	-	B, A	35.5	174	1	-	2.80	35.4	10	0	.06	-	.07	-, 1	.001	49	376	436	498	572	622
9	2, 3	-	B, A, C	37.3	160	< 1	-14	2.32	33.8	-25	-25	.33	143.6	.10	1, 1	.001	50	358	414	474	561	620
10	1	1	B, A, C	45.7	140	< 1	+27	1.59	-	-40	-45	.11	154.1	.10	1, 1	< .001	60	364	382	421	492	538
11	2, 3	-	B, A, C	36.8	158	< 1	+14	2.46	34.3	6	-15	.28	146.4	.11	1, 1	< .001	50	355	426	492	574	625
12	1	1	B, A, C, D	42.6	8/ 126	-	+22	1.83	32	-	-30	.038	-	.01	1, -	.000	9/ 51.3	336	385	441	496	525
13	1	(10)	B, C, D	41.9	136	-	+27	1.60	-	-45	-55	.12	144.0	.06	1, 1	.000	46.7	344	369	425	465	509
14	2, 3	-	B, C, D, A	39.0	164	-	-	2.10	33.0	-10	-20	.15	150	.10	1, 1	.001	53	356	430	478	546	595
15	1	1	B, C, D, A	43.0	126	-	+23	1.50	-	-10	-25	.07	138	.07	1, 1	.001	52	333	371	418	488	530
16	2, 3	-	B, D, A	33.5	180	1½	-	2.7	35	5	0	.20	-	.14	-, 1	< .01	47	364	440	515	585	620
17	1, 2	1	C	43.1	133	-	+23	-	-	-	-	.071	-	.07	1, -	.000	9/ 47.6	348	376	415	477	514
18	2	2	C	36.8	>150	< 2	-	2.38	34	-	< 0	.18	-	.14	-, 1	.000	9/ 49.7	365	417	501	579	620
19	1, 2, 3	2	C	39.7	>150	< 1	-	2.38	34	-	< 0	.11	-	< .06	-, 1	.000	9/ 55.3	364	407	497	555	578
20	3	-	C	37.2	>150	< 1½	-	2.38	34	-	< 0	.14	-	.13	-, 1	.000	9/ 50.6	363	418	502	575	617
21	1, 2	1	C	43.1	136	-	+27	-	-	-	-30	.04	149.0	.10	1, -	-	9/ 47.8	345	374	416	475	523
22	1, 2, 3	2	C	37.3	208	< 1	-	2.93	35.8	-	-10	.45	158.5	.06	-, 1	-	9/ 51.1	414	466	504	550	600
23	3	-	C	35.1	182	< 1½	-	2.99	36.0	-	-5	.21	147.6	.13	-, 1	-	9/ 46.8	371	451	506	566	619
24	1, 2	1	C	46.0	138	-	+22	< 1.35	30.0	-	<-20	.054	154	.07	1, -	.000	9/ 53.2	350	370	412	478	532
25	1, 2	1	C	42.7	134	-	+23	1.57	31	<-20	<-20	.12	-	.06	1, -	-	9/ 49.8	336	378	431	492	529
26	1, 2, 3	2	C	40.7	152	< 1	-	2.38	34	-4	<-20	.07	-	.06	-, 1	.000	9/ 52.2	361	405	467	542	587
27	-	1	C	47.0	144	-	+30	1.90	32.3	-20	-25	.15	156	-	-, 1	.001	9/ 57.0	378	395	420	457	478
28	2, 1	1	C	46.7	146	-	+21	1.90	32.3	-16	-25	.16	158	-	-, 1	.001	9/ 57.3	377	394	425	456	480
29	3, 2, 1	2	C	36.9	192	1	-	3.15	36.5	22	15	.16	172	-	-, 1	.005	9/ 53.7	442	484	525	586	625
30	1, 2	1	C	42.5	166	-	+21	1.80	-	2	-20	.06	142.7	.01	1a, 1a	.003	49.8	369	395	430	480	520

1/ Classes 1, 2, 3, and 4 of diesel fuel oils are described in the text.

2/ District letters refer to the areas in which the fuels are sold (see fig. 1). In each item the arrangement of district letters indicates in decreasing order the relative volumes of distribution of the fuel.

3/ Viscosities reported in one term were converted to equivalent figures in the other, where possible, as explained in the text.

4/ The figures shown are Ramsbottom carbon residues. Some of the determinations were made by the Conradson method, ASTM D-189-54, and the data were converted to Ramsbottom values using table 1 and figure 4 in the appendix of the Conradson method.

5/ Corrosion test results are shown by number according to ASTM D130-55T.

6/ Distillation figures have been converted, where necessary, to temperatures at 760 mm. Hg according to table 1 in ASTM D86-54.

7/ Does not meet the requirements of fuels of this grade.

8/ Flash point by Tag closed tester, ASTM D56-52.

9/ Calculated Cetane Index from chart in appendix 2 of ASTM D975-53T.

10/ Offered as kerosine.

TABLE 4.--Analyses of grade 1-D diesel fuel oils, 1956--(Cont.)

Item	Marketed as: Diesel fuel oil, class 1/	Marketed as: Burner fuel oil ASTM D396 Grade	Distributed in districts 2/	Gravity ASTM D287 ° API	Flash point ASTM D93 ° F.	Color: Union ASTM D155 No.	Color: Saybolt ASTM D156 No.	Viscosity at 100° F. 3/: Kinematic ASTM D445 Cs.	Viscosity at 100° F. 3/: Saybolt ASTM D88 Sec.	Cloud test ASTM D97 ° F.	Pour point ASTM D97 ° F.	Sulfur content ASTM D129 wt. percent	Aniline point ASTM D611 ° F.	Carbon Res. 4/ ASTM D524 on 10% Res., %	Corrosion ASTM D130 5/ 3 hours at 122° F. and 212° F.	Ash ASTM D482 percent	Cetane number ASTM D613	Distillation 6/ ASTM D86 Temperature ° F. % recovered: IBP	10	50	90	End point
Eastern region: Districts A, B, and C (Cont.)																						
31	2	2	C	35.7	170	< 2½	-	2.65	34.9	5	0	0.18	148.9	0.04	1a, 1b	0.002	54.1	371	433	495	573	621
32	1, 2	1	C	46.7	145	< 1	-	1.85	32.1	< 10	<-10	.11	167	.031	1a, 1a	.000	55.0	380	396	438	520	598
33	1, 2	1	C	45.0	140	< 1	-	1.48	-	<-10	<-10	.07	150.8	.027	1a, 1b	.000	49.4	362	376	412	468	510
34	1, 2, 3	2	C	40.0	179	< 1	-	2.59	34.7	<-10	<-10	.14	164.1	.055	1a, 1a	.000	59.5	400	452	498	556	604
35	1, 2, 3	2	C	37.6	173	1	-	2.66	34.9	-2	<-10	.17	155.3	.084	1a, 1a	.000	56	404	458	506	562	610
36	3	2	C	32.3	177	1½	-	2.85	35.6	18	5	.23	135.8	.108	1a, 1a	.000	46.0	406	476	522	578	622
37	1	1	C	46.7	145	-	+21	1.57	-	-	< 0	.048	156.2	.06	1, -	.000	7/56.4	368	385	420	481	528
38	1	1	C	46.8	126	1	-	1.55	-	-25	-25	-	-	-	-, 1	-	7/56.0	342	380	418	470	511
39	1	1	C	47.6	160	-	+19	1.67	31.4	-20	-20	-	163	-	-, -	-	7/58.3	348	388	420	460	566
40	1, 2	1	C, B	43.9	128	< 1	-	1.62	-	<-10	<-10	.14	149	.038	1a, 1b	.001	50.5	330	374	424	502	582
41	1	(8)	C, B, A	45.5	146	-	+26	1.64	-	-48	-55	.07	154.8	-	1, 1	.000	56.3	353	378	416	470	509
42	1, 2	1	C, E	42.7	137	< 1	-	1.72	-	<-10	<-10	.11	149.9	.045	1a, 1b	.000	52.5	368	390	434	492	532
43	1	1	C, E	41.5	132	-	+19	1.63	31.2	-	-35	.385	-	.08	1, 1b	-	7/53.0	322	402	462	534	572
44	1	1	C, E	41.7	130	-	+20	1.63	31.2	-	-35	.195	-	.08	1, 1b	-	7/54.3	350	409	467	540	573
45	3	2	C, E	33.1	170	2	-	2.55	34.0	-	0	.291	-	.08	1, -	-	7/43.2	390	440	509	575	619
46	1	1	C, E	43.1	144	< 1	+13	1.67	-	-45	-45	.10	148.9	.08	1, 1	<.001	52	356	389	435	486	520
47	1, 2, 3	2	C, E	40.4	154	< 1	+19	2.32	33.8	-20	-20	.11	156.8	.07	1, 1	<.001	51	366	440	487	530	573
48	1	1	C, E	41.0	150	-	+23	2.0	32.6	-20	-30	9/.064	148.3	<.06	1a, 2b	.000	7/50.0	354	399	452	550	560
49	1, 2	1	C, E	42.9	136	-	+12	1.70	-	-48	-45	.07	149.4	.02	1a, 1b	<.001	55.0	342	391	429	478	530
50	1	1	C, E, A	42.4	141	< 1	+21	1.72	-	-40	-40	.13	148.5	.08	1, 1	<.001	50	361	395	438	496	528
51	1, 2, 3	2	C, E, A	39.4	160	< 1½	-	2.58	34.7	-5	-5	.14	159.0	.08	1, 1	<.001	52	350	424	502	576	617
52	2, 3	2	C, E, A	36.6	140	< 1	+25	2.46	34.3	-5	-5	.20	144.0	.14	1, 1	.002	46	358	430	504	567	607
53	4	-	C, E, A	28.0	192	< 2	-	2.89	35.7	6	5	.10	116.4	10/.09	1, 1	.001	11/36	406	470	526	582	613
60	2, 3	2	D, B, A	32.4	160	2	-	2.8	35.5	0	-5	.20	-	.15	-, 1	<.01	45	-	435	520	586	620
61	1	1	D, B, A	43.6	132	< 1	-	1.60	-	-30	-45	.04	150.8	.08	1, 1	.001	51.1	330	380	426	480	521
62	2, 3	2	D, B, A, C, G	37.7	166	< 1	-14	2.34	33.8	-14	-25	.26	149.0	.12	1, 1	<.001	52	374	420	482	562	616
63	1	1	D, B, A, G	44.5	140	< 1	+26	1.65	-	-36	-40	.07	155.0	.05	1, 1	<.001	58	348	380	430	496	526
64	1, 2	1	D, B, C	42.3	156	-	+30	1.75	-	-40	-45	.02	149.4	.04	1a, 1b	.004	55.0	360	394	437	500	544
65	2	2	D, B, C	35.3	178	1	-	2.49	34.4	-6	-10	.21	142.4	.00	1a, 1a	<.001	49.8	357	440	501	572	620
66	1, 2	1	D, E, B	42.1	138	-	+30	1.69	-	-30	-30	.020	151	.01	1, 1	.000	51.9	344	379	433	490	523
67	2, 3	-	D, E, B	38.3	186	< 1	-	2.99	36.0	5	0	.061	164	.02	1, 1	.000	56.2	396	453	517	576	624
68	1, 2, 3(W)	-	D, E, C, G	39.9	163	(Dyed)		2.37	34.0	-10	-20	9/.058	155.1	.08	1a, 1a	.000	7/52.3	360	426	478	562	612
69	1, 2, 3(S)	-	D, E, C, G	37.4	185	(Dyed)		2.71	35.1	5	-10	9/.112	154	.08	1a, 1a	.000	7/50.5	408	452	499	566	618
70	1	1	D, E, C, G	42.9	140	-	+28	1.54	-	-30	-50	9/.052	144.8	<.06	1a, 2d	.000	7/47.2	367	390	416	460	506
77	2, 3	2	E, C	37.1	165	2	-	2.23	33.5	-5	-15	9/.184	123.3	11/.19	1a, 1a	.002	7/45.6	370	411	473	560	612
78	1	1	E, C	41.0	140	1	+23	1.84	32.0	<-30	<-30	.09	151.2	.07	1, 1	Trace	51.0	370	404	448	502	524
79	2	-	E, C	37.0	170	1	-	3.44	37.5	10	0	.172	168.1	.06	1, 1	<.01	54.0	410	468	522	564	586
80	1	(8)	E, C, G	43.7	136	-	+26	1.54	-	-44	-55	.065	146.8	-	1, 1	.000	50.4	348	373	415	475	514

81	1	1	E, C, G	42.0	140	-	+21	1.81	-	-24	-30	.08	150.8	.08	2,3	.000	51.9	340	375	443	527	566
82	3	-	E, C, G	40.0	158	< 1	-	2.23	33.5	12	-20	.17	153.8	.08	1,1	.000	52.5	364	420	476	543	600
84	1,2	-	E, F, C, G	43.9	136	-	+21	1.55	-	-60	-70	.091	149.2	.07	-, 1b	.001	53.0	342	376	420	465	506
85	2,1	1	E, F, C, G	43.7	132	-	+15	1.60	-	-50	-50	.111	147.4	.07	-, 1a	.001	51.0	332	360	421	506	544
86	3,2,1	-	E, F, C, G	38.4	195	1	-	3.07	36.3	-6	-10	.183	158.0	.09	-, 1a	.001	54.0	424	458	496	556	612
89	1,2	1	E, G, F, C, D	42.2	142	-	+26	1.7	-	<-15	<-25	.08	-	.15	1, -	<.01	49	365	380	438	504	533
Average (74 samples)				40.5	-	-	-	2.11	33.0	-	-	0.142	150.2	0.076	-	0.001	51.3	364	408	460	524	567
Minimum				28.0	126	< 1	+30	< 1.35	30.0	-60	-70	0.020	112.6	0.00	-	0.000	36	322	360	412	456	478
Maximum				47.6	210	2½	-14	3.44	37.5	22	15	.75	172	.19	-	.005	60	442	484	526	586	625
Southern region: District D																						
54	2,3	-	D	35.6	182	1	-	3.36	37.2	5	0	-	152	0.08	-, 1a	0.001	51.0	395	460	505	560	620
55	1	(8)	D	42.2	138	-	+30	1.56	-	-50	-45	.03	140.7	-	1,1	.000	46.2	344	372	420	486	520
56	1,2,3	-	D	37.1	174	< 1	-	2.68	35.1	2	0	.05	151.8	.08	1,1	.000	51.1	376	444	496	564	622
57	1	-	D	42.6	142	1	-	1.70	31.5	-20	-40	.06	152	.06	1,1	.000	49.0	352	396	436	492	538
58	1	-	D	43.5	145	-	+15	1.63	-	-45	-50	.08	152	.07	1, -	.000	50.6	350	390	422	475	497
59	3	-	D	38.4	186	< 1	-	2.74	35.2	-2	-5	.056	160.5	.00	1,1	.000	54.8	418	457	506	563	614
60	2,3	2	D, B, A	32.4	160	2	-	2.8	35.5	0	-5	.20	-	.15	-, 1	< .01	45	-	435	520	586	620
61	1	1	D, B, A	43.6	132	< 1	-	1.60	-	-30	-45	.04	150.8	.08	1,1	.001	51.1	330	380	426	480	521
62	2,3	2	D, B, A, C, G	37.7	166	< 1	-14	2.34	33.8	-14	-25	.26	149.0	.12	1,1	< .001	52	374	420	482	562	616
63	1	1	D, B, A, G	44.5	140	< 1	+26	1.65	-	-36	-40	.07	155.0	.05	1,1	< .001	58	348	380	430	496	526
64	1,2	1	D, B, C	42.3	156	-	+30	1.75	-	-40	-45	.02	149.4	.04	1a, 1b	.004	55.0	360	394	437	500	544
65	2	2	D, B, C	35.3	178	1	-	2.49	34.4	-6	-10	.21	142.4	.00	1a, 1a	<.001	49.8	357	440	501	572	620
66	1,2	1	D, E, B	42.1	138	-	+30	1.69	-	-30	-30	.020	151	.01	1,1	.000	51.9	344	379	433	490	523
67	2,3	-	D, E, B	38.3	186	< 1	-	2.99	36.0	5	0	.061	164	.02	1,1	.000	56.2	396	453	517	576	624
68	1,2,3(W)	-	D, E, C, G	39.9	163	(Dyed)		2.37	34.0	-10	-20	[9] .058	155.1	.08	1a, 1a	.000	[7] 52.3	360	426	478	562	612
69	1,2,3(S)	-	D, E, C, G	37.4	185	(Dyed)		2.71	35.1	5	-10	[9] .112	154	.08	1a, 1a	.000	[7] 50.5	408	452	499	566	618
70	1	1	D, E, C, G	42.9	140	-	+28	1.54	-	-30	-50	[9] .052	144.8	< .06	1a, 2d	.000	[7] 47.2	367	390	416	460	506
71	1	(8)	D, G, J	43.7	140	-	+30	1.56	-	-40	-50	.046	154.1	-	1,2	.000	50.1	353	379	421	477	506
1	1,2	1	A, D, B	41.5	135	-	+27	1.7	-	< -20	< -25	.04	-	.07	1, -	< .01	49	340	375	425	500	530
2	1,2	1	A, D, B	42.2	132	-	+26	1.6	-	-55	-50	.02	-	.04	1, -	< .01	46	337	376	422	473	508
12	1	1	B, A, C, D	42.6	[12] 126	-	+22	1.83	32	-	-30	.038	-	.01	1, -	.000	[7] 51.3	336	385	441	496	525
13	1	(8)	B, C, D	41.9	136	-	>+27	1.60	-	-45	-55	.12	144.0	.06	1,1	.000	46.7	344	369	425	465	509
14	2,3	-	B, C, D, A	39.0	164	< 1	-	2.10	33.0	-10	-20	.15	150	.10	1,1	.001	53	356	430	478	546	595
15	1	1	B, C, D, A	43.0	126	-	+23	1.50	-	-10	-25	.07	138	.07	1,1	.001	52	333	371	418	488	530
16	2,3	-	B, D, A	33.5	180	1½	-	2.7	35	5	0	.20	-	.14	-, 1	< .01	47	364	440	515	585	620
89	1,2	1	E, G, F, C, D	42.2	142	-	+26	1.7	-	<-15	<-25	.08	-	.15	1, -	< .01	49	365	380	438	504	533
111	1,2	1	G, E, F, D	43.9	144	<1	+22	1.52	-	-50	-55	.05	148.0	.06	1a, 1b	.000	48	344	372	412	472	542
112	2	2	G, E, F, D	33.9	168	<1	-	2.35	33.9	-8	-5	.23	134.4	.14	1a, 1a	.000	43.8	356	439	501	536	597
Average (28 samples)				40.1	-	-	-	2.06	32.8	-	-	0.090	149.7	0.070	-	0.001	50.3	360	407	458	519	562
Minimum				32.4	126	< 1	+30	1.50	-	-55	-55	0.02	134.4	0.00	-	0.000	43.8	330	369	412	460	497
Maximum				44.5	186	2	-14	3.36	37.2	5	0	.26	164	.15	-	.005	58	418	460	520	586	624

[1] Classes 1, 2, 3, and 4 of diesel fuel oils are described in the text. (S) or (W) indicates the fuel is recommended for use only during the summer or winter season, respectively.

[2] District letters refer to the areas in which the fuels are sold (see fig. 1). In each item the arrangment of district letters indicates in decreasing order the relative volumes of distribution of the fuel. Fuels listed above the line separating items 53 and 60 are generally sold in greatest volumes in the Eastern region. Fuels listed above the line separating items 71 and 1 are generally sold in greatest volume in the Southern region. The fuels listed below the lines are generally sold in lesser volumes in the two respective regions than in some other region.

[3] Viscosities reported in one term were converted to equivalent figures in the other, where possible, as explained in the text. The Saybolt viscosity given in the average is the equivalent of the kinematic viscosity average.

[4] Some of the determinations were made by the Conradson method, ASTM D189-54, and the data were converted to Ramsbottom values using table 1 and figure 4 in the appendix of the Conradson method.

[5] Corrosion test results are given separately for the two temperatures by number according to ASTM D130-55T.

[6] Distillation figures have been converted, where necessary, to temperatures at 760 mm. Hg according to table 1 in ASTM D86-54.

[7] Calculated Cetane Index from chart in appendix 2 in ASTM D975-53T. [8] Offered as kerosine.

[9] Sulfur content by lamp method, ASTM D90-55T or ASTM D1266-55T.

[10] Result of test on 100 percent sample. Not included in average. [11] Does not meet the requirement of fuels of this grade.

[12] Flash point by Tag closed tester, ASTM D56-52

TABLE 4.--Analyses of grade 1-D diesel fuel oils, 1956 (Cont.)

Item	Marketed as		Distributed	Gravity	Flash point	Color		Viscosity at 100° F. 3/		Cloud test	Pour point	Sulfur content	Aniline point	Carbon Res. 4/	Corrosion ASTM D130 5/	Ash	Cetane number	Distillation 6/ ASTM D86 Temperature ° F.				
	Diesel fuel oil, class 1/	Burner fuel oil ASTM D396 Grade	In districts 2/	ASTM D287 ° API	ASTM D93 ° F.	Union ASTM D155 No.	Saybolt ASTM D156 No.	Kinematic ASTM D445 Cs.	Saybolt ASTM D88 Sec.	ASTM D97 ° F.	ASTM D97 ° F.	ASTM D129 wt. percent	ASTM D611 ° F.	ASTM D524 on 10% Res., %	3 hours at 122° F. and 212° F.	ASTM D482 percent	ASTM D613	% recovered IBP	10	50	90	End point
Central region: Districts E, F, and G																						
72	3	-	E	35.1	182	1	-	2.17	33.2	-22	-20	7/0.68	131.8	0.15	1a, 1a	<0.001	43.7	401	433	481	539	591
73	1, 3	1	E	41.7	8/ 145	-	+20	1.99	32.6	-25	-30	.13	154.4	.06	1, -	.001	53.6	345	398	461	538	578
74	3	2	E	36.0	165	2	-	2.40	34.1	-5	-15	.19	143.6	.11	1, -	.003	48.7	374	436	494	568	624
75	1	1	E	43.9	8/ 140	-	+25	1.60	-	-55	-65	.06	194.8	.06	1, -	.001	52.8	356	388	419	461	510
76	3	-	E	36.5	>150	1	-	2.68	35.0	-	-15	.28	143	.09	1, -	.001	9/ 45.2	336	420	478	548	588
77	2, 3	2	E, C	37.1	165	2	-	2.23	33.5	-5	-15	.184	123.3	7/ .19	1a, 1a	.002	9/ 45.6	370	411	473	560	612
78	1	1	E, C	41.0	140	1	+23	1.84	32.0	<-30	<-30	.09	151.2	.07	1, 1	Trace	51.0	370	404	448	502	524
79	2	-	E, C	37.0	170	1	-	3.44	37.5	10	0	.172	168.1	.06	1, 1	<.01	54.0	410	468	522	564	586
80	1	(11)	E, C, G	43.7	136	-	+26	1.54	-	-44	-55	.065	146.8	-	1, 1	.000	50.4	348	373	415	475	514
81	1	1	E, C, G	42.0	140	-	+21	1.81	-	-24	-30	.08	150.8	.08	2, 3	.000	51.9	340	375	443	527	566
82	3	-	E, C, G	40.0	158	< 1	-	2.23	33.5	12	-20	.17	153.8	.08	1, 1	.000	52.5	364	420	476	543	600
83	1, 2	1	E, F	40.8	162	-	+25	1.94	32.4	-34	-35	.29	150.3	.10	1a, 1b	< .001	55.5	388	412	458	520	562
84	1, 2	-	E, F, C, G	43.9	136	-	+21	1.55	-	-60	-70	.091	149.2	.07	-, 1b	.001	53.0	342	376	420	465	506
85	2, 1	1	E, F, C, G	43.7	132	-	+15	1.60	-	-50	-50	.111	147.4	.07	-, 1a	.001	51.0	332	360	421	506	544
86	3, 2, 1	-	E, F, C, G	38.4	195	1	-	3.07	36.3	-6	-10	.183	158.0	.09	-, 1a	.001	54.0	424	458	496	556	612
87	3(S)	-	E, G	39.0	170	3	-	2.62	34.8	0	-10	.15	161.6	.09	-, 1	.002	55.4	348	446	502	568	619
88	1, 2, 3(W)	-	E, G	40.0	155	3	-	2.12	33.1	-15	-25	.14	160.5	.09	-, 1	.001	53.2	362	418	474	544	602
89	1, 2	1	E, G, F, C, D	42.2	142	-	+26	1.7	-	<-15	<-25	.08	-	.15	1, -	<.01	49	365	380	438	504	533
90	1, 2	-	F, H, E	43.8	129	-	+29	-	-	-	-	.076	-	-	1a, 1b	-	49.0	335	371	407	461	510
91	2, 1	1	F, H, E	42.7	122	-	+19	1.7	-	-	-25	.086	-	< .06	1a, 1b	-	49.0	317	362	421	504	550
92	3	-	G	41.8	155	-	+15	1.85	32.1	-30	-35	.072	154.4	.08	-, 1	.002	51.6	347	391	451	530	590
93	3	-	G	34.6	215	2½	-	3.00	36.0	-2	-10	.15	152	7/ .21	1, -	.000	49.7	435	472	507	562	623
94	-	-	G	41.9	158	(Red)		1.94	32.4	1	-5	.039	160.2	.064	-, 1	.000	9/ 55.5	373	424	472	520	560
95	-	-	G	36.4	156	1	-	2.21	33.4	-1	-5	.09	142.9	.092	-, 1	.002	9/ 47.5	352	439	494	553	600
96	3(S)	-	G	30.2	>200	1	-	3.43	37.4	20	10	.259	131.5	.10	1, 1	.001	43.8	456	507	536	588	612
97	3	-	G	37.0	161	1	-	2.60	34.8	-2	-5	.187	150.3	.13	1, 1	.000	49.1	350	435	506	568	608
98	2	2	G	41.8	140	<1	-	1.91	32.3	-22	-25	.064	155	.096	1, 1	.004	51.9	336	383	458	550	589
99	3	-	G	31.5	200	<1	-	2.63	34.8	-4	-5	.31	126.0	.14	1a, 1a	.000	43.4	412	460	508	564	600
100	1, 2	-	G	43.0	132	-	+27	-	-	-	-45	.12	150	.12	1a, 1b	-	9/ 49.3	338	383	426	470	502
101	2, 1	1	G	43.3	134	-	+21	1.70	31.5	-	-25	.142	153	.12	1a, 1b	-	56.8	346	386	438	502	546
102	2, 3	-	G	39.0	180	< 1	-	2.80	35.4	0	-5	.12	166	.05	-, 1	.000	57.5	390	452	502	553	598
103	3	-	G, E	40.3	165	< 1	-	2.34	33.9	-15	-15	.10	161	.05	-, 1	.000	53.1	356	414	480	556	595
104	1, 2	-	G, E	44.2	122	-	+27	-	-	-	-	.072	116.3	-	1a, -	-	47.4	346	363	403	466	513
105	2, 1	1	G, E	43.3	124	-	+17	1.52	-	-	-35	.111	120.2	.06	-, 1a	-	50.1	344	375	422	500	526
106	2, 3, 1	2	G, E	35.4	142	1½	-	2.38	34.1	-	0	.287	116.6	.09	-, 1a	-	52.6	358	406	506	592	616
107	3, 2, 1	-	G, E	38.3	-	1	-	2.68	35.0	4	0	.179	136.4	.09	-, 1a	.00	54.4	408	444	519	575	623
108	3	-	G, E	33.8	188	-	-	2.68	35.0	-	-5	.317	121.8	-	-	-	43.0	412	442	512	588	620
109	1, 2	1	G, E, F	43.3	137	-	+24	1.59	-	-50	-50	.108	148	.07	1, 1	.000	48.4	346	370	422	485	518
110	3(S)	-	G, E, F	34.5	170	1	-	3.79	38.5	12	10	.223	146	.07	1, 1	.000	50.2	368	464	543	592	624
111	1, 2	1	G, E, F, D	43.9	144	<1	+22	1.52	-	-50	-55	.05	148.0	.06	1a, 1b	.000	48	344	372	412	472	542
112	2	2	G, E, F, D	33.9	168	<1	-	2.35	33.9	-8	-5	.23	134.4	.14	1a, 1a	.000	43.8	356	439	501	536	597
113	1	-	G, F	39.2	174	1	-	2.71	35.1	2	-5	.25	161	.06	-, 1b	.000	9/ 55.0	382	436	501	570	610
114	1, 2, 3(W)	-	G, F	39.0	172	1½	-	2.29	33.7	-18	-20	.40	150	.08	-, 1a	.000	50	376	430	478	550	596
115	1, 2, 3(S)	-	G, F	37.2	176	>1½	-	2.60	34.8	-11	-15	.45	156	.08	-, 1a	.000	51	395	454	500	560	600
116	2, 3	2	G, F	34.5	168	>2	-	2.26	33.6	-14	-20	.43	131	.15	1, -	.000	40	376	434	490	550	596
117	1	1	G, F	41.7	154	-	+20	1.86	32.1	-32	-40	.10	152	.06	1, -	.000	50	376	397	440	498	538
118	2, 3	2	G, F, E	37.3	168	>1	-	2.30	33.7	-	-20	.25	-	7/ .16	1, -	.000	9/ 48.8	358	428	490	550	598
119	2, 3	2	G, F, E	32.8	160	>1	-	2.46	34.3	-	-5	.28	-	7/ .16	1, -	.000	9/ 41.7	368	422	504	572	616
120	1, 2	1	G, F, E	41.4	138	-	+17	1.91	32.3	-	-30	.19	-	.05	1, -	.000	9/ 55.0	354	390	474	544	568
121	2, 3	-	G, F, E	38.2	192	(Dyed red)		2.96	35.9	30	0	.195	165	.074	1, 1	.003	57.0	391	440	532	583	608

122	2,3	2	G,F,E	34.2	174	<1	-	2.35	33.9	-10	-20	.302	133	.112	1,1	.002	41.4	364	419	501	562	583
123	1,2	1	G,F,E	43.6	8/130	-	+28	1.59	-	-46	-50	.037	150	.059	1,1	.001	51.6	332	374	426	490	520
124	1	(11)	G,F,E	45.6	138	-	+30	1.56	-	<-10	<-10	.11	157.6	.03	1,2	.000	52.9	344	370	420	486	524
125	1	1	G,F,E	44.1	142	-	+23	1.98	-	<-10	<-10	.23	163.4	.04	1,1	.000	55.1	350	390	454	536	570
126	3	2	G,F,J	38.4	212	1	-	3.02	36.1	-8	-10	.09	163	.08	-,1	.000	54.6	449	479	509	547	601
127	1,2	-	G,I,F	44.6	122	-	+28	1.4	-	-	<-30	.105	148	-	1a,1a	-	54	350	374	410	460	504
128	2,1	1	G,I,F	43.7	124	-	+14	1.6	-	-	<-30	.204	147	.06	1a,1b	-	52	336	372	416	470	521
129	2,3,1	2	G,I,F	35.1	144	<1½	-	2.65	34.9	0	0	.373	135	.09	1a,1b	-	50	326	419	506	580	620
42	1,2	1	C,E	42.7	137	1	-	1.72	-	-10	-10	.11	149.9	.045	1a,1b	.000	52.5	368	390	434	492	532
43	1	1	C,E	41.5	132	-	+19	1.63	31.2	-	-35	.385	-	.08	1,1b	-	9/53.0	322	402	462	534	572
44	1	1	C,E	41.7	130	-	+20	1.63	31.2	-	-35	.195	-	.08	1,1b	-	9/54.3	350	409	467	540	573
45	3	2	C,E	33.1	170	2	-	2.55	34.0	-	0	.291	-	.08	1,-	-	9/43.2	390	440	509	575	619
46	1	1	C,E	43.1	144	1	+13	1.67	-	-45	-45	.10	148.9	.08	1,1	.001	52	356	389	435	486	520
47	1,2,3	2	C,E	40.4	154	1	+19	2.32	33.8	-20	-20	.11	156.8	.07	1,1	.001	51	366	440	487	530	573
48	1	1	C,E	41.0	150	-	+23	2.0	32.6	-20	-30	10/.064	148.3	.06	1a,2b	.000	9/50.0	354	399	452	550	560
49	1,2	1	C,E	42.9	136	-	+12	1.70	-	-48	-45	.07	149.4	.02	1a,1b	.001	55.0	342	391	429	478	530
50	1	1	C,E,A	42.4	141	1	+21	1.72	-	-40	-40	.13	148.5	.08	1,1	.001	50	361	395	438	496	528
51	1,2,3	2	C,E,A	39.4	160	1½	-	2.58	34.7	-5	-5	.14	159.0	.08	1,1	.001	52	350	424	502	576	617
52	2,3	2	C,E,A	36.6	140	1	+25	2.46	34.3	-5	-5	.20	144.0	.14	1,1	.002	46	358	430	504	567	607
53	4	-	C,E,A	28.0	192	2	-	2.89	35.7	6	5	.10	116.4	.09	1,1	.001	7/36	406	470	526	582	613
62	2,3	2	D,B,A,C,G	37.7	166	<1	-14	2.34	33.8	-14	-25	.26	149.0	.12	1,1	<.001	52	374	420	482	562	616
63	1	1	D,B,A,G	44.5	140	<1	+26	1.65	-	-36	-40	.07	155.0	.05	1,1	<.001	58	348	380	430	496	526
66	1,2	1	D,E,B	42.1	138	-	+30	1.69	-	-30	-30	.020	151	.01	1,1	.000	51.9	344	379	433	490	523
67	2,3	-	D,E,B	38.3	186	1	-	2.99	36.0	5	0	.061	164	.02	1,1	.000	56.2	396	453	517	576	624
68	1,2,3(W)	-	D,E,C,G	39.9	163	(Dyed)		2.37	34.0	-10	-20	10/.058	155.1	.08	1a,1a	.000	9/52.3	360	426	478	562	612
69	1,2,3(S)	-	D,E,C,G	37.4	185	(Dyed)		2.71	35.1	5	-10	10/.112	154	.08	1a,1a	.000	9/50.5	408	452	499	566	618
70	1	1	D,E,C,G	42.9	140	-	+28	1.54	-	-30	-50	10/.052	144.8	<.06	1a,2d	.000	9/47.2	367	390	416	460	506
71	1	(11)	D,G,J	43.7	140	-	+30	1.56	-	-40	-50	.046	154.1	-	1,2	.000	50.1	353	379	421	477	506
135	1	1	H,L,F,I,K	40.8	8/120	-	+20	1.65	-	<-50	<-50	.37	-	.087	1,-	-	9/46.6	320	384	435	501	530
136	2(W)	2	H,L,F,I,K	36.5	188	-	+3	2.80	35.4	-18	-20	.18	-	.098	-,1	-	9/49.7	411	458	505	570	605
140	2,3(S)	2	I,G	39.0	152	1	-	2.62	34.8	5	0	.08	152	.03	-,1	.000	51.4	363	432	511	578	609
141	2,3(W)	2	I,G	39.1	158	1	-	2.61	34.8	-10	-15	.06	155	.05	-,1	.000	51.1	361	422	485	571	613
142	1,2	-	I,G,H,F	37.7	140	1	-	2.80	35.4	-	-10	.085	154.0	<.06	1a,1a	.001	54.0	345	430	500	564	613
143	1,2,3(W)	-	I,G,H,K	38.4	160	-	+21	2.44	34.8	-12	-15	.498	153.5	.06	1,1	.000	9/50.2	374	430	484	559	599
144	1,2,3(S)	-	I,G,H,K	37.8	174	-	+8	2.76	35.0	4	-5	.447	158.0	.07	1,1	.000	9/53.1	394	445	509	583	618
148	1	(11)	I,K,H,F	45.4	128	-	+28	1.48	-	<-20	<-20	.11	144.0	-	1,1	.000	46.5	331	348	376	437	500
149	1	1	I,K,H,F	44.8	128	-	+22	1.54	-	<-20	<-25	.22	146.0	.026	1,1	.000	49.1	310	352	396	460	528
150	2	2	I,K,H,F	38.9	164	<1	-	2.87	35.6	-6	-10	7/.63	156.0	.09	1,1	.000	51.6	364	407	468	548	590
151	3	-	I,K,H,F	38.8	168	<1	-	2.75	35.2	-6	-10	.44	152.0	.08	1,1	.000	51.8	368	411	474	550	600
156	1,2	1	J,G	38.5	158	1	-	2.0	32.6	-20	-30	.42	140	.12	1,-	.004	9/46.0	386	424	458	502	540
157	3	-	J,G	39.9	173	1	-	2.42	34.1	-20	-20	.06	160	.08	-,1	.000	51.1	385	441	488	545	603
158	1,2,3(S)	-	J,G,I	38.3	184	(Amber)		2.59	34.7	10	5	.165	154	.08	1,1	.000	9/51.6	409	450	494	576	624
159	1,2,3(W)	-	J,G,I	39.6	178	(Amber)		2.33	33.8	-8	-10	.154	151	.08	1,1	.000	9/52.3	409	446	482	541	589
161	1	1	J,I,G,E,F	42.2	148	-	+26	1.82	32.0	-30	-30	.014	150.1	.00	1,-	.000	51.7	358	402	446	500	526
162	3	-	J,I,G,E,F	37.4	174	1	-	2.60	34.8	4	0	.473	149.9	.05	2,-	.002	52.9	388	439	501	583	621
Average (95 samples)				39.6	-	-	-	2.22	33.4	-	-	0.184	149.0	0.085	-	0.001	50.5	366	414	469	533	575
Minimum				28.0	122	<1	+30	1.4	31.2	-60	-70	0.014	116.3	0.02	-	0.000	36	310	348	376	437	500
Maximum				45.6	215	3	-14	3.79	38.5	30	10	.68	194.8	.21	-	.004	58	456	507	543	592	624

1/ Classes 1, 2, 3, and 4 of diesel fuel oils are described in the text. (S) or (W) indicates the fuel is recommended for use only during the summer or winter season, respectively.

2/ District letters refer to the areas in which the fuels are sold (see fig. 1). In each item the arrangement of district letters indicates in decreasing order the relative volumes of distribution of the fuel. Fuels listed above the line separating items 129 and 42 are generally sold in greatest volume in the Central region. The fuels listed below the line are generally sold in lesser volume in this region than in some other region.

3/ Viscosities reported in one term were converted to equivalent figures in the other, where possible, as explained in the text. The Saybolt viscosity given in the average is the equivalent of the kinematic viscosity average.

4/ The figures shown are Ramsbottom carbon residues. Some of the determinations were made by the Conradson method, ASTM D189-54, and the data were converted to Ramsbottom values using table 1 and figure 4 in the appendix of the Conradson method.

5/ Corrosion test results are shown by number according to ASTM D130-55T.

6/ Distillation figures have been converted, where necessary, to temperatures at 760 mm. Hg according to table 1 in ASTM D86-54. 7/ Does not meet the requirement of fuels of this grade.

8/ Flash point by Tag closed tester, ASTM D56-52.

9/ Calculated Cetane Index from chart in appendix 2 of ASTM D975-53T.

10/ Determined by lamp method, ASTM D1266-55T. 11/ Offered as kerosine.

TABLE 4.--Analyses of grade 1-D diesel fuel oils, 1956 (Cont.)

Item	Marketed as: Diesel fuel oil, class 1/	Marketed as: Burner fuel oil ASTM D396 Grade	Distributed in districts 2/	Gravity ASTM D287 ° API	Flash point ASTM D93 ° F.	Color: Union ASTM D155 No.	Color: Saybolt ASTM D156 No.	Viscosity at 100° F. 3/: Kinematic ASTM D445 Cs.	Viscosity at 100° F. 3/: Saybolt ASTM D88 Sec.	Cloud test ASTM D97 ° F.	Pour point ASTM D97 ° F.	Sulfur content ASTM D129 wt. percent	Aniline point ASTM D611 ° F.	Carbon Res. 4/ ASTM D524 on 10% Res., %	Corrosion ASTM D130 5/ 3 hours at 122° F. and 212° F.	Ash ASTM D482 percent	Cetane number ASTM D613	Distillation 6/ ASTM D86 Temperature ° F. % recovered: IBP	10	50	90	End point
Rocky Mountain region: Districts H, I, J, and K																						
130	1	1	H	39.8	145	1	-	2.00	32.6	-38	-40	0.344	149	0.04	1, 1	<0.001	51.3	359	416	470	510	551
131	2(W)	2	H	37.6	168	1	-	2.93	35.8	-6	-10	7/ .780	156	.04	1, 1	< .001	53.3	365	447	512	577	625
132	2, 3	-	H, L	36.8	173	1½	-	2.73	35.2	-3	-15	7/ .60	150	.10	1, -	.000	48.7	395	453	508	570	613
133	1	1	H, L	44.2	138	-	+26	1.46	-	<-30	<-30	8/ .074	142.9	.06	1, 1	.001	9/ 49.2	348	372	412	471	509
134	1	1	H, L	41.8	150	-	+26	1.70	-	<-30	<-30	8/ .190	143.2	.06	1, 1	.000	9/ 48.3	346	392	434	503	558
135	1	1	H, L, F, I, K	40.8	10/ 120	-	+20	1.65	-	<-50	<-50	.37	-	.087	1, -	-	9/ 46.6	320	384	435	501	530
136	2(W)	2	H, L, F, I, K	36.5	188	-	+3	2.80	35.4	-18	-20	.18	-	.098	-, 1	-	9/ 49.7	411	458	505	570	605
137	2, 3	-	I	39.5	158	(Dyed red)		1.80	31.9	-35	-40	.076	138	.101	1a, 1	.000	45.6	373	411	446	502	537
138	1	-	I	44.0	136	-	+10	1.53	-	-40	-50	.01	147	.06	1, -	.000	48.7	349	378	418	475	520
139	3	-	I	33.8	166	1½	-	2.62	34.8	0	-5	.17	134	.12	-, 1	.000	43.8	451	495	527	571	608
140	2, 3(S)	2	I, G	39.0	152	1	-	2.62	34.8	5	0	.08	152	.03	-, 1	.000	51.4	363	432	511	578	609
141	2, 3(W)	2	I, G	39.1	158	1	-	2.61	34.8	-10	-15	.06	155	.05	-, 1	.000	51.1	361	422	485	571	613
142	1, 2	-	I, G, H, F	37.7	140	1	-	2.80	35.4	-	-10	.085	154.0	<.06	1a, 1a	.001	54.0	345	430	500	564	613
143	1, 2, 3(W)	-	I, G, H, K	38.4	160	-	+21	2.44	34.8	-12	-15	.498	153.5	.06	1, 1	.000	9/ 50.2	374	430	484	557	599
144	1, 2, 3(S)	-	I, G, H, K	37.8	174	-	+8	2.76	35.0	4	-5	.447	158.0	.07	1, 1	.000	9/ 53.1	394	445	509	583	618
145	1, 2	-	I, H	41.6	150	-	+21	1.90	32.3	-54	-55	.026	145.4	-	-, 1b	.000	9/ 48.2	373	403	435	476	511
146	2, 1	1	I, H	40.8	156	-	+19	1.75	-	-54	-55	.353	147.0	.08	-, 1a	.000	9/ 47.8	385	414	442	493	531
147	1	1	I, K	42.2	134	-	+25	1.69	31.8	<-28	<-20	.024	148.5	.06	1, 1	Trace	9/ 48.3	364	393	429	469	499
148	1	(11)	I, K, H, F	45.4	128	-	+28	1.48	-	<-20	<-20	.11	144.0	-	1, 1	.000	46.5	331	348	376	437	500
149	1	1	I, K, H, F	44.8	128	-	+22	1.54	-	<-20	<-25	.22	146.0	.026	1, 1	.000	49.1	310	352	396	460	528
150	2	2	I, K, H, F	38.9	164	<1	-	2.87	35.6	-6	-10	7/ .63	156.0	.09	1, 1	.000	51.6	364	407	468	548	590
151	3	-	I, K, H, F	38.8	168	<1	-	2.75	35.2	-6	-10	.44	152.0	.08	1, 1	.000	51.8	368	411	474	550	600
152	1	-	J	41.9	128	<1	-	1.57	-	-	<-30	.09	144.5	.04	-, 1	.001	47	320	360	400	460	530
153	2, 3	-	J	38.8	176	1	-	2.32	33.8	-12	-20	.35	154	.10	-, 1	.000	52.0	383	418	481	565	614
154	1	-	J	41.6	154	-	+7	1.72	-	-50	-50	.26	144	.08	1, -	.000	51.0	369	395	429	477	507
155	1	1	J	44.0	136	(Yellow)		1.70	-	-30	-35	.095	149	.06	-, 1	.000	9/ 51.3	374	400	425	470	500
156	1, 2	1	J, G	38.5	158	1	-	2.0	32.6	-20	-30	.42	140	.12	1, -	.004	9/ 46.0	386	424	458	502	540
157	3	-	J, G	39.9	173	1	-	2.42	34.1	-20	-20	.06	160	.08	-, 1	.000	51.1	385	441	488	545	603
158	1, 2, 3(S)	-	J, G, I	38.3	184	(Amber)		2.59	34.7	10	5	.165	154	.08	1, 1	.000	9/ 51.6	409	450	494	576	624
159	1, 2, 3(W)	-	J, G, I	39.6	178	(Amber)		2.33	33.8	-8	-10	.154	151	.08	1, 1	.000	9/ 52.3	409	446	482	541	589

160	2	-	J, I	40.4	174	1	-	2.51	34.5	20	0	.234	160.5	.00	1, -	.001	57.7	386	430	497	580	618
161	1	1	J, I, G, E, F	42.2	148	-	+26	1.82	32.0	-30	-30	.014	150.1	.00	1, -	.000	51.7	358	402	446	500	526
162	3	-	J, I, G, E, F	37.4	174	1	-	2.60	34.8	4	0	.473	149.9	.05	2, -	.002	52.9	388	439	501	583	621
163	1	1	K, L	42.4	134	-	+20	1.60	-	-35	-50	.20	146	.05	1, 1	.001	48.1	330	386	429	488	559
164	1, 2	-	K, M	42.0	138	< 1	-	1.9	32.3	-40	-40	.24	151.0	.06	-, 1	.00	50.0	332	389	450	534	584
71	1	(11)	D, G, J	43.7	140	-	+30	1.56	-	-40	-50	.046	154.1	-	1, 2	.000	50.1	353	379	421	477	506
90	1, 2	-	F, H, E	43.8	129	-	+29	-	-	-	-	.076	-	-	1a, 1b	-	49.0	335	371	407	461	510
91	2, 1	1	F, H, E	42.7	122	-	+19	1.7	-	-	-25	.086	-	.06	1a, 1b	-	49.0	317	362	421	504	550
126	3	2	G, F, J	38.4	212	1	-	3.02	36.1	-8	-10	.09	163	.08	-, 1	.000	54.6	449	479	509	547	601
127	1, 2	-	G, I, F	44.6	122	-	+28	1.4	-	-	< -30	.105	148	-	1a, 1a	-	54	350	374	410	460	504
128	2, 1	1	G, I, F	43.7	124	-	+14	1.6	-	-	< -30	.204	147	.06	1a, 1b	-	52	336	372	416	470	521
129	2, 3, 1	2	G, I, F	35.1	144	< 1½	-	2.65	34.9	0	0	.373	135	.09	1a, 1b	-	50	326	419	506	580	620
Average (42 samples)				40.4	-	-	-	2.13	33.1	-	-	0.226	149.3	<0.067	-	0.000	50.2	365	410	458	520	564
Minimum				33.8	122	< 1	+30	1.4	-	-54	-55	0.01	134	0.00	-	0.000	43.8	310	348	376	437	499
Maximum				45.4	212	1½	+3	3.02	36.1	20	5	.780	163	.12	-	.004	57.7	451	495	527	583	625
Western region: Districts L, M, and N																						
165	1	1	M, L	37.4	136	1	-	1.95	32.4	-34	-40	8/0.203	137	0.02	1a, -	< 0.01	43	334	397	454	530	568
166	1, 2	-	M, L, N	42.4	160	-	+30	2.1	33	-	< -30	.10	-	.10	-, 1	.002	52	380	425	459	505	548
167	1	1	M, N	37.6	142	1	-	1.99	32.6	-24	-25	8/ .118	139	.07	1a, -	.009	44	341	388	454	520	574
168	1, 2	-	N	43.5	150	< 1	-	1.88	32.1	< -30	< -30	.06	163	.06	-, 1	.00	50.5	350	390	427	480	538
169	1, 2	-	N, L, M	40.8	150	-	+30	2.1	33	-	< -20	.25	-	.09	-, 1	< .01	51	375	420	455	500	540
170	1, 2	-	N, L, M	38.5	146	< 1	-	1.85	32.1	-26	-30	.08	136.5	.09	-, 1	.00	51.0	350	395	450	528	577
171	1	1	N, M, L	38.3	140	< 1½	-	1.80	32	-40	-60	.210	132	.08	1a, 1a	< .001	45	332	380	434	500	552
172	1	1	N, M, L	43.0	10/ 130	-	+30	1.75	-	-54	-55	8/ .008	162	.06	1a, -	.009	49	360	394	432	472	510
173	1	1	N, M, L	43.0	144	(Yellow)		1.64	-	-36	-55	.01	157.1	.03	1, 1	< .001	48	350	389	430	476	510
174	-	1	N, M, L	44.1	158	< 1	-	1.60	-	-44	-45	.24	149.5	.05	1, 1	< .001	52	370	404	426	470	512
132	2, 3	-	H, L	36.8	173	1½	-	2.73	35.2	-3	-15	7/ .60	150	.10	1, -	.000	48.7	395	453	508	570	613
133	1	1	H, L	44.2	138	-	+26	1.46	-	<-30	<-30	8/ .074	142.9	.06	1, 1	.001	9/ 49.2	348	372	412	471	509
134	1	1	H, L	41.8	150	-	+26	1.70	-	<-30	<-30	8/ .190	143.2	.06	1, 1	.000	9/ 48.3	346	392	434	503	558
135	1	1	H, L, F, I, K	40.8	10/ 120	-	+20	1.65	-	<-50	<-50	.37	-	.087	1, -	-	9/ 46.6	320	384	435	501	530
136	2(W)	2	H, L, F, I, K	36.5	188	-	+3	2.80	35.4	-18	-20	.18	-	.098	-, 1	-	9/ 49.7	411	458	505	570	605
163	1	1	K, L	42.4	134	-	+20	1.60	-	-35	-50	.20	146	.05	1, 1	.001	48.1	330	386	429	488	559
164	1, 2	-	K, M	42.0	138	< 1	-	1.9	32.3	-40	-40	.24	151.0	.06	-, 1	.00	50.0	332	389	450	534	584
Average (17 samples)				40.8	-	-	-	1.91	32.3	-	-	0.184	146.9	0.069	-	0.002	48.6	354	401	447	507	552
Minimum				36.5	134	< 1	+30	1.46	-	-54	-60	0.008	132	0.02	-	0.000	43	320	372	412	470	509
Maximum				44.2	188	1½	+3	2.80	35.4	-3	-15	.60	163	.10	-	.009	52	411	458	508	570	613

1/ Classes 1, 2, 3, and 4 of diesel fuel oils are described in the text. (S) or (W) indicates the fuel is recommended for use only during the summer or winter season, respectively.

2/ District letters refer to the areas in which the fuels are sold (see fig. 1). In each item the arrangement of district letters indicates in decreasing order the relative volumes of distribution of the fuel. Fuels listed above the line separating items 164 and 71 are generally sold in greatest volume in the Rocky Mountain region. Fuels listed above the line separating items 174 and 132 are generally sold in greatest volume in the Western region. The fuels listed below the lines are generally sold in lesser volumes in the two respective regions than in some other region.

3/ Viscosities reported in one term were converted to equivalent figures in the other, where possible, as explained in the text. The Saybolt viscosity given in the average is the equivalent of the kinematic viscosity average.

4/ Some of the determinations were made by the Conradson method, ASTM D189-54, and the data were converted to Ramsbottom values using table 1 and figure 4 in the appendix of the Conradson method.

5/ Corrosion test results are given by number according to ASTM D130-55T.

6/ Distillation figures have been converted, where necessary, to temperatures at 760 mm. Hg according to table 1 in ASTM D86-54.

7/ Does not meet the requirement of fuels of this grade.

8/ Determined by lamp method.

9/ Calculated Cetane Index from chart in appendix 2 of ASTM D975-53T.

10/ Flash point by Tag closed tester, ASTM D56-52.

11/ Offered as kerosine.

TABLE 5.—Analyses of grade 2-D diesel fuel oils, 1956

Item	Marketed as: Diesel fuel oil, class 1/	Marketed as: Burner fuel oil ASTM D396 Grade	Distributed in districts 2/	Gravity ASTM D287 ° API	Flash point ASTM D93 ° F.	Color Union ASTM D155 No.	Viscosity at 100° F. 3/ Kinematic ASTM D445 Cs.	Viscosity at 100° F. 3/ Saybolt ASTM D88 Sec.	Cloud test ASTM D97 ° F.	Pour point ASTM D97 ° F.	Sulfur content ASTM D129 percent	Aniline point ASTM D611 ° F.	Carbon Res. 4/ ASTM D524 On 10% Res., %	Corrosion ASTM D130 5/ 3 hours at 122° F. and 212° F.	Ash ASTM D482 percent	Cetane number ASTM D613	Distillation 6/ ASTM D158 Temperature ° F. IPB	Distillation % recovered 10	Distillation % recovered 50	Distillation % recovered 90	End point
Eastern region: Districts A, B, and C.																					
175	2,3	2	B	36.2	166	2	2.42	34.1	-6	-15	0.57	144.0	0.031	1,1	0.000	47.9	360	435	488	575	635
176	1,2,3	-	B	37.0	194	(Red)	2.86	35.6	-2	0	.43	154.8	.022	1,1	.000	51.1	413	460	508	586	638
177	3	-	B	33.7	156	> 1½	2.64	34.9	6	0	.35	141.1	.19	1,1	< .001	46.0	346	428	512	594	652
178	2,3	-	B	36.0	198	1	2.94	35.8	6	0	.10	154.4	.10	1,1	< .001	50.0	424	472	504	564	628
179	2,3	2	B, A, C	35.7	150	< 2	2.36	33.9	-6	-15	.50	139.1	.18	1,1	.003	49	338	416	492	576	626
180	2,3	2	B, A, C	35.4	154	< 2	2.72	35.1	14	-15	.58	144.9	.15	1,1	.003	46	356	433	510	600	650
181	2	2	B, A, C	37.8	172	< 1	2.8	35.4	5	0	.70	152	.09	1a, -	.001	53.0	347	437	510	593	646
182	2,3	-	B, A, C, D	39.3	164	1½	2.68	35.0	0	0	.157	159	.04	-, 1	.000	52.6	345	435	500	584	630
183	2,3	2	B, A, D, C, G, E	32.2	156	< 1½	2.62	34.8	4	-10	.51	129.0	.19	1,1	< .001	46	340	432	516	596	640
184	1,2,3	-	B, A	36.2	170	1	2.68	35.0	8	0	.21	151.3	.09	1,1	.001	52	366	424	506	588	636
185	2	2	B, C, D	36.3	150	< 1	2.53	34.5	2	-10	.22	144.0	.16	1,1	.000	48.2	336	390	506	600	640
186	3	-	B, C, D	36.3	170	< 1	2.69	35.0	10	0	.33	157.0	.20	1,1	.000	51.0	382	455	525	588	672
187	2,3	2	B, C, D, A	36.3	140	< 1½	2.40	34.1	5	-5	.45	136	.13	1,1	.001	46	312	396	496	584	638
188	3	2	B, D	34.1	158	2	2.40	34.1	6	-10	.18	136	.21	-, 1	.002	46.9	358	430	492	586	648
189	2,3,4	-	B, D, A	34.0	170	1½	2.75	35.2	0	0	.40	145	.06	1,3	.001	46.0	370	410	508	586	648
190	2,3	-	B, D, A	35.0	160	1½	2.4	34	0	-5	.40	-	.18	-, 1	< .01	48	360	425	495	575	635
191	3	2	B, D, A, C	34.6	162	2	2.71	35.1	0	0	.225	142	.04	-, 1	.001	46.5	354	439	512	586	636
192	2	2	C	32.3	156	< 1½	2.38	34.0	-	0	.30	130.3	.31	-, 1	-	7/ 40.7	329	425	503	580	637
193	1,2,3	2	C	39.8	160	1	2.44	34.2	-	0	.28	163	.07	-, 1	.000	7/ 57.0	366	420	506	602	660
194	2	2	C	34.9	155	1½	2.52	34.5	5	-5	.21	-	.06	-, 1	.000	7/ 45.6	349	426	500	588	642
195	3	-	C	38.0	151	1	2.68	35	-10	0	.19	-	.08	-, 1	.000	7/ 51.1	353	410	495	594	649
196	3,2,1	2	C	45.0	152	< 1	2.16	33.2	-10	-25	.15	166	-	-, 1	.002	7/ 56.5	384	408	440	530	642
197	1,2,3	2	C	43.1	175	< 1	2.82	35.5	8	-5	.06	177.8	.084	1a, 1a	.000	63.0	392	438	502	614	706
198	2,3	2	C	38.6	155	8/44	3.06	36.2	12	5	.146	164.1	.06	1, -	.000	7/ 57.1	367	452	523	603	648
199	2,	2	C	41.4	146	1½	2.16	33.2	-2	-5	.09	168	.10	-, 1	.000	7/ 54.0	354	415	448	562	-
200	2	2	C	42.6	180	< 1½	3.15	36.5	20	15	-	178	-	-, -	-	7/ 62.6	384	410	504	654	710
201	3	2	C	43.3	172	< 1	2.5	34.2	8	-10	.06	166	.07	1,1	.000	7/ 61.8	375	419	490	592	629
202	3	2	C, B	38.0	138	1½	2.22	33.4	-4	< -10	.22	146.3	.084	1a, 1a	.001	47.0	340	394	488	580	638
203	2	2	C, B, A	39.6	158	< 1	2.51	34.4	2	0	.11	161.0	.06	1,1	.000	54.6	368	410	486	588	636
204	1,2,3	2	C, E	36.9	161	< 1	3.40	37.3	2	< -10	.20	164.1	.082	1a, 1a	.000	59.0	370	468	540	594	632
205	3	2	C, E	39.3	177	1	2.67	34.9	-	0	.339	-	.08	1, -	-	7/ 53.8	376	416	494	596	640
206	4	-	C, E	29.5	215	< 3	3.43	37.4	10	10	.10	128.8	9/ .09	1,1	.001	41	430	488	546	607	638
207	2	2	C, E	35.3	164	1½	2.59	34.7	-5	-5	.12	142.4	.04	1a, 1a	< .001	48.9	384	442	508	578	632
208	3	2	C, E	34.9	174	3	2.77	35.3	< -10	< -10	.16	144.3	.093	1a, 1a	.000	46.5	398	448	508	562	640
209	1,2,3	2	C, E	38.4	153	1½	2.66	34.9	< -10	< -10	.12	157.3	.097	1a, 1a	.000	53.0	382	434	500	576	636
210	3	2	C, E	29.4	215	3	3.71	38.3	8	-5	.18	127	.108	1a, 1a	.000	41.0	442	494	550	610	638
212	3,2	2	D, B	33.9	172	1½	3.02	36.1	5	0	.11	140	.08	-, 1a	.001	46.0	394	448	501	582	640
213	2,3	-	D, B, A	37.0	192	< 1	3.23	36.8	2	-5	.13	163	.12	-, 1	.005	54.1	422	481	524	578	638
214	1,2,3	-	D, B, A	36.7	166	< 1	2.75	35.2	4	0	.20	153	.06	1,3	.000	52.0	370	450	506	584	649
215	1,2,3	-	D, B, A	38.5	182	< 1	2.90	35.7	4	0	.21	163.6	.04	1,1	< .001	52.8	386	450	518	584	638
216	2,3	2	D, B, A	34.2	162	< 2½	2.40	34.1	-10	-15	.31	136.4	.14	1,1	< .001	45.6	370	434	492	575	630

217	2,3	2	D, B, A	35.4	160	2	2.4	34	0	-5	.55	-	.20	-,1	.01	46	-	430	495	570	630
220	2	2	D, E, B	35.0	172	<1½	2.35	33.9	8	5	.095	141	.09	1,1	.000	45.6	374	430	489	589	655
229	2	-	E, C	38.2	195	<1	3.95	39.0	-	0	.22	162.3	.06	-,1	.001	7/55.6	396	450	519	598	644
230	2	2	E, C, G	38.2	150	<1	2.28	33.6	14	0	.18	147.7	.04	1,1	.000	48.7	326	375	482	600	646
231	3	-	E, C, G	39.9	152	<1	2.68	35.0	10	0	.18	156.9	.06	1,1	.000	52.9	338	398	488	593	655
232	2, 3, 1	2	E, F, C, G	37.6	150	<1½	2.07	32.9	-4	-15	.522	139.1	.09	-,1b	.001	47.0	336	372	457	574	644
234	2,3	2	E, G, C, F, D	34.5	170	2	2.5	34.5	10	0	.80	-	.20	-,1	<.01	47	380	430	490	590	650
Average (48 samples)				36.8	-	-	2.69	35.0	-	-	0.273	150.4	0.106	-	0.001	50.3	369	431	502	587	645
Minimum				29.4	138	<1	2.07	32.9	<-10	-25	0.06	127	0.022	-	0.000	40.7	312	372	440	530	626
Maximum				45.0	215	3	3.95	39.0	20	15	.70	178	.31	-	.005	63.0	442	494	550	654	710
Southern region: District D																					
211	4	-	D	36.7	200	<1	3.32	37.0	4	0	0.13	163	0.13	-,1	0.005	54.9	440	484	527	586	632
212	3,2	2	D, B	33.9	172	1½	3.02	36.1	5	0	.11	140	.08	-,1a	.001	46.0	394	448	501	582	640
213	2,3	-	D, B, A	37.0	192	<1	3.23	36.8	2	-5	.13	163	.12	-,1	.005	54.1	422	481	524	578	638
214	1, 2, 3	-	D, B, A	36.7	166	<1	2.75	35.2	4	0	.20	153	.06	1,3	.000	52.0	370	450	506	584	649
215	1, 2, 3	-	D, B, A	38.5	182	<1	2.90	35.7	4	0	.21	163.6	.04	1,1	<.001	52.8	386	450	518	584	638
216	2,3	2	D, B, A	34.2	162	2½	2.40	34.1	-10	-15	.31	136.4	.14	1,1	<.001	45.6	370	434	492	575	630
217	2,3	2	D, B, A	35.4	160	2	2.4	34	0	-5	.55	-	.20	-,1	.01	46	-	430	495	570	630
218	2,3	-	D, E	37.1	188	<1	3.78	38.5	8	5	.07	170	.05	-,1	.000	57.0	416	500	543	588	634
219	2	-	D, E	36.4	172	2	2.99	36.0	0	-10	.17	156	.10	1,1	.001	53.1	374	444	512	596	662
220	2	2	D, E, B	35.0	172	<1½	2.35	33.9	8	5	.095	141	.09	1,1	.000	45.6	374	430	489	589	655
221	3	-	D, E, G	35.0	186	2	2.99	36.0	5	-5	.30	145	.10	1,1	.001	51.0	364	440	506	612	664
222	3	-	D, E, G	33.7	156	2	2.99	36.0	10	0	.25	138	.10	1,1	.001	42.3	338	438	504	594	652
223	3	-	D, G, J	37.2	162	>1	2.94	35.8	10	0	.32	156.5	.1	1,1	.000	55.1	352	422	518	606	668
182	2,3	-	B, A, C, D	39.3	164	1½	2.68	35.0	0	0	.157	159	.04	-,1	.000	52.6	345	435	500	584	630
183	2,3	2	B, A, D, C, G, E	32.2	156	<1½	2.62	34.8	4	-10	.51	129.0	.19	1,1	<.001	46	340	432	516	596	640
184	1, 2, 3	-	B, A, D, G	36.2	170	1	2.68	35.0	8	0	.21	151.3	.09	1,1	.001	52	366	424	506	588	636
185	2	2	B, C, D	36.8	150	<1	2.53	34.5	2	-10	.22	144.0	.16	1,1	.000	48.2	336	390	506	600	660
186	3	-	B, C, D	36.3	170	<1	2.69	35.0	10	0	.33	157.0	.20	1,1	.000	51.0	382	455	525	588	672
187	2,3	2	B, C, D, A	36.3	140	<1½	2.40	34.1	5	-5	.45	136	.13	1,1	.001	46	312	396	496	584	638
188	3	2	B, D	34.1	158	2	2.40	34.1	6	-10	.18	136	.21	-,1	.002	46.9	358	430	492	586	648
189	2, 3, 4	-	B, D, A	34.0	170	1½	2.75	35.2	0	0	.40	145	.06	1,3	.001	46.0	370	410	508	586	648
190	2,3	-	B, D, A	35.0	160	1½	2.4	34	0	-5	.40	-	.18	-,1	<.01	48	360	425	495	575	635
191	3	2	B, D, A, C	34.6	162	2	2.71	35.1	0	0	.225	142	.04	-,1	.001	46.5	354	439	512	586	636
234	2,3	2	E, G, C, F, D	34.5	170	2	2.5	34.5	10	0	.80	-	.20	-,1	<.01	47	380	430	490	590	650
241	2,3	-	G, D	37.1	204	(Red)	3.36	37.2	25	15	.119	164	.083	1a, 1	.000	57.0	417	480	531	599	632
242	3	-	G, D	38.4	158	<1	2.50	34.4	-10	-15	.44	158	.08	1,1	.000	55	358	440	510	570	626
243	2	-	G, D	39.1	164	<1	2.50	34.4	-2	-5	.38	160	.08	1,1	.000	58	364	418	512	576	628
244	2	-	G, D	37.2	172	<1	3.00	36.0	6	0	.42	160	.10	1,1	.000	56	370	440	520	584	636
245	2	-	G, D	34.2	180	<1	3.90	38.8	8	0	.78	150	.14	1,1	.001	50	388	480	580	632	684
246	4	-	G, D, E, F	28.6	180	3½	3.95	39	-50	-90	.70	135	.11	1,3	-	40	420	452	536	624	634
249	3	-	G, E, F, D	40.1	182	8/48	3.0	36	0	-10	.12	165	.07	-,1	.001	7/51.7	392	426	472	558	650
Average (31 samples)				35.8	-	-	2.86	35.6	-	-	0.312	150.6	0.112	-	0.001	50.1	374	440	511	589	644
Minimum				28.6	140	<1	2.35	33.9	-50	-90	0.07	129.0	0.04	-	0.000	40	312	390	472	558	626
Maximum				40.1	204	3½	3.95	39	25	15	.80	170	.21	-	.005	58	440	500	580	632	684

1/ Classes 1, 2, 3, and 4 of diesel fuel oils are described in the text.

2/ District letters refer to the areas in which the fuels are sold (see fig. 1). In each item the arrangement of district letters indicates in decreasing order the relative volumes of distribution of the fuel. Fuels listed above the lines separating items 210 and 212 are generally sold in greatest volume in the Eastern region. The fuels listed above the line separating items 223 and 182 are generally sold in greatest volume in the Southern region. The fuels listed below the lines are generally sold in lesser volumes in the two respective regions than in some other region.

3/ Viscosities reported in one term were converted to equivalent figures in the other as explained in the text. The Saybolt viscosity given in the average is the equivalent of the kinematic viscosity average.

4/ Some of the determinations were made by the Conradson method, ASTM D189-54, and the data were converted to Ramsbottom values using table 1 and figure 4 in the appendix of the Conradson method.

5/ Corrosion test results are given separately for the two temperatures by number according to ASTM D130-55T.

6/ Distillation figures have been converted, where necessary, to temperatures at 760 mm. Hg according to table 1 in ASTM D86-54. 7/ Calculated Cetane Index from chart in appendix 2 of ASTM D975-53T.

8/ Color by Saybolt chromometer, ASTM D156-53T.

9/ Result of test on 100 percent sample. Not included in average.

TABLE 5.--Analyses of grade 2-D diesel fuel oils, 1956 (Cont.)

Item	Marketed as		Distributed in districts 2/	Gravity	Flash point	Color	Viscosity at 100° F. 3/		Cloud test	Pour point	Sulfur content	Aniline point	Carbon Res. 4/	Corrosion ASTM D130 5/	Ash	Cetane number	Distillation 6/ ASTM D158 Temperature ° F.				
	Diesel fuel oil, class 1/	Burner fuel oil ASTM D396 Grade		ASTM D287	ASTM D93	Union ASTM D155	Kinematic ASTM D445	Saybolt ASTM D88	ASTM D97	ASTM D97	ASTM D129	ASTM D611	ASTM D524 On 10%	3 hours at 122° F. and 212° F.	ASTM D482	ASTM D613	IPB	% recovered 10	50	90	End point
				° API	° F.	No.	Cs.	Sec.	° F.	° F.	percent	° F.	Res., %		percent						
Central region: Districts E, F, and G																					
224	3	-	E	32.7	170	2	2.35	33.9	0	-10	0.24	149.0	0.12	1, -	0.002	41.5	368	444	496	578	644
225	2	2	E	37.9	190	7/+20	3.37	37.2	2	5	.18	167.4	.10	1a, 1a	< .001	57.0	391	479	541	593	635
226	3	-	E	37.3	146	< 2	2.67	35.0	10	5	.50	151.7	.16	1a, 1a	.000	53.7	326	423	510	592	650
227	2, 3	-	E	37.2	150	< 1	2.80	35.4	-5	-10	.11	161	.06	-, 1a	.000	52	366	430	504	594	645
228	2	2	E	37.6	145	1½	2.59	34.7	-10	-15	.12	153	.08	-, 1a	.000	50	356	421	491	587	635
229	2	-	E, C	38.2	195	< 1	3.95	39.0	-	0	.22	162.3	.06	-, 1	.001	8/55.6	396	450	519	598	644
230	2	2	E, C, G	38.2	150	< 1	2.28	33.6	14	0	.18	147.7	.04	1, 1	.000	48.7	326	375	482	600	646
231	3	-	E, C, G	39.9	152	< 1	2.68	35.0	10	0	.18	156.9	.06	1, 1	.000	52.9	338	398	488	593	655
232	2, 3, 1	2	E, F, C, G	37.6	150	< 1½	2.07	32.9	-4	-15	.522	139.1	.09	-, 1b	.001	47.0	336	372	457	574	644
233	2, 3	-	E, G	36.5	175	1½	2.3	33.5	0	-10	.45	-	.20	-, 1	< .01	49	385	425	480	575	635
234	2, 3	2	E, G, C, F, D	34.5	170	2	2.5	34.5	10	0	.80	-	.20	-, 1	< 01	47	380	430	490	590	650
235	2, 3	2	E, G, F	37.5	150	> 1	2.30	33.7	-2	-5	.17	148	.13	1, -	.000	46.2	330	402	490	574	630
236	2, 3, 1	2	F, H, E	35.2	143	1	2.77	35.3	-	0	.352	-	.06	1a, 1a	-	47.0	334	408	514	598	648
237	3, 2, 1	-	F, H, E	38.8	154	< 1	2.71	35.1	-4	-5	.216	-	< .06	1a, 1a	-	52	364	410	480	575	644
238	2, 3	-	G	35.6	156	< 1½	2.62	34.8	-4	-5	.147	147	.140	1, 1	.004	47.8	342	422	517	588	627
239	2, 3	2	G	30.7	160	2	2.90	35.7	6	0	.195	130	.220	1, 1	.002	40.1	351	447	530	598	636
240	2, 3, 1	2	G	36.0	156	< 1½	2.68	35.0	-	0	.26	149	.12	-, 1b	-	51.3	366	436	502	572	626
241	2, 3	-	G, D	37.1	204	(Red)	3.36	37.2	25	15	.119	164	.083	1a, 1	.000	57.0	417	480	531	599	632
242	3	-	G, D	38.4	158	< 1	2.50	34.4	-10	-15	.44	158	.08	1, 1	.000	55	358	440	510	570	626
243	2	-	G, D	39.1	164	< 1	2.50	34.4	-2	-5	.38	160	.08	1, 1	.000	58	364	418	512	576	628
244	2	-	G, D	37.2	172	< 1	3.00	36.0	6	0	.42	160	.10	1, 1	.000	56	370	440	520	584	636
245	2	-	G, D	34.2	180	< 1	3.90	38.8	8	0	.78	150	.14	1, 1	.001	50	388	480	580	632	684
246	4	-	G, D, E, F	28.6	180	3½	3.95	39	-50	-90	.70	135	.11	1, 3	-	40	420	452	536	624	634
247	3	2	G, E, F	36.0	156	1	3.02	36.1	-2	0	.207	142	.14	1, 1	.000	49.5	350	426	522	586	628
248	2, 1	2, 1	G, E, F	35.8	168	< 1	2.87	35.6	4	0	.20	150.0	.12	1a, 1a	.000	50.1	358	432	526	600	628
249	3	-	G, E, F, D	40.1	182	7/48	3.0	36	0	-10	.12	165	.07	-, 1	.001	8/51.7	392	426	472	558	650
250	3(S)	-	G, E, L	31.2	172	2	2.32	33.8	0	-10	9/.204	119.1	.22	1a, 1a	.001	8/34.7	400	447	478	552	636
251	3(W)	-	G, E, L	28.9	170	2	2.72	35.1	10	-5	9/.130	118.7	.11	1a, 1a	.000	8/34.3	418	470	504	585	664
252	1, 2(S)	-	G, F	38.5	158	1	2.68	35.0	-	0	.14	159	.03	1, 1	.006	55.0	352	436	500	582	648
253	2, 3	2	G, F	37.0	172	1½	2.87	35.6	-	-5	.20	149	.13	1, 1	.006	50.2	360	438	507	588	664

254	2	2	G, F	32.6	180	1½	2.68	35.0	6	-5	.33	133	.07	-, 1b	.002	8/41.0	376	429	501	595	647
255	3, 2, 1	-	G, F	40.0	158	< 1	2.44	34.2	0	-5	.196	155	.06	1a, 1b	-	55	360	397	473	542	658
256	2	2	G, F, E	37.8	166	< 1	2.34	33.8	16	0	.67	162.7	.08	1, 1	.000	52.0	352	428	518	608	670
257	3	-	G, F, E	41.7	158	< 1	2.52	34.5	4	-5	.33	167.4	.05	1, 1	.000	56.0	342	402	490	586	644
258	2, 3	-	G, F, E	37.2	180	< 1	2.62	34.8	-15	-15	.21	-	.09	-, 1a	.000	8/49.3	420	448	494	576	638
259	1, 2	-	G, F, E, J	38.4	200	< 1	3.15	36.5	0	-5	.17	166.6	.12	-, 1	.002	55.6	422	478	520	580	632
260	2, 3	-	G, I	39.8	160	3	2.55	34.6	12	5	.20	152	.08	1, 1	.001	50	360	394	462	608	670
261	2, 4	-	G, I	35.0	175	5	4.58	41.0	25	15	.31	154	.11	1, 1	.002	52	400	450	560	620	670
262	3	-	G, I	32.8	180	< 1½	2.87	35.6	0	0	.490	136	.10	-	-	40	400	459	513	587	634
183	2, 3	2	B, A, D, C, G, E	32.2	156	< 1½	2.62	34.8	4	-10	.51	129.0	.19	1, 1	< .001	46	340	432	516	596	640
184	1, 2, 3	-	B, A, D, G	36.2	170	1	2.68	35.0	8	0	.21	151.3	.09	1, 1	.001	52	366	424	506	588	636
204	1, 2, 3	2	C, E	36.9	161	< 1	3.40	37.3	2	< -10	.20	164.1	.082	1a, 1a	.000	59.0	370	468	540	594	632
205	3	2	C, E	39.3	177	1	2.67	34.9	-	0	.339	-	.08	1, -	-	8/53.8	376	416	494	596	660
206	4	-	C, E	29.5	215	< 3	3.43	37.4	10	10	.10	128.8	10/ .09	1, 1	.001	41	430	488	546	607	638
207	2	2	C, E	35.3	164	1½	2.59	34.7	-5	-5	.12	142.4	.04	1a, 1a	< .001	48.9	384	442	508	578	632
208	3	2	C, E	34.9	174	3	2.77	35.3	< -10	< -10	.16	144.3	.093	1a, 1a	.000	46.5	398	448	508	562	640
209	1, 2, 3	2	C, E	38.4	153	1½	2.66	34.9	< -10	< -10	.12	157.3	.097	1a, 1a	.000	53.0	382	434	500	576	636
210	3	2	C, E	29.4	215	3	3.71	38.3	8	-5	.18	127	.108	1a, 1a	.000	41.0	442	494	550	610	638
218	2, 3	-	D, E	37.1	188	< 1	3.78	38.5	8	5	.07	170	.05	-, 1	.000	57.0	416	500	543	588	634
219	2	-	D, E	36.4	172	2	2.99	36.0	0	-10	.17	156	.10	1, 1	.001	53.1	374	444	512	596	662
220	2	2	D, E, B	35.0	172	< 1½	2.35	33.9	8	5	.095	141	.09	1, 1	.000	45.6	374	430	489	589	655
221	3	-	D, E, G	35.0	186	2	2.99	36.0	5	-5	.30	145	.10	1, 1	.001	51.0	364	440	506	612	664
222	3	-	D, E, G	33.7	156	2	2.99	36.0	10	0	.25	138	.10	1, 1	.001	42.3	338	438	504	594	652
223	3	-	D, G, J	37.2	162	> 1	2.94	35.8	10	0	.32	156.5	.1	1, 1	.000	55.1	352	422	518	606	668
276	2(S)	2	H, L, F, I, K	36.3	17C	1	2.80	35.4	-12	-10	.35	-	.090	-, 1	-	8/52.4	387	447	525	603	635
278	3	2	I, G	33.5	155	1	3.18	36.6	-	0	.10	140.0	< .06	1a, 1a	.010	47.0	364	454	521	601	647
279	1, 2	-	I, G, H, F	36.1	145	1	2.90	35.7	-	-5	.085	148.0	< .06	1a, 1a	.001	51.5	352	441	512	584	637
287	2	2	J, G	37.6	175	1	3.3	37.0	5	-5	.37	154	.08	1, -	.005	8/52.5	396	446	508	588	652
288	3	-	J, G, I	30.9	195	1½	2.62	34.7	0	-5	.67	121	.09	1, -	.006	41.3	422	451	501	584	665
289	2, 3	2	J, G, I	34.5	195	2½	2.99	36.0	5	-10	.59	143	.07	1, -	.002	48.6	429	457	516	607	653
Average (60 samples)				35.9	-	-	2.87	35.6	-	-	0.285	148.6	0.100	-	0.001	49.5	375	438	509	590	645
Minimum				28.6	143	1	2.07	32.9	-50	-90	0.07	118.7	0.03	-	0.000	34.3	326	372	457	542	626
Maximum				41.7	215	5	4.58	41.0	25	15	.80	170	.220	-	.010	59.0	442	500	580	632	684

1/ Classes 1, 2, 3, and 4 of diesel fuel oils are described in the text. (S) or (W) indicates the fuel is recommended for use only during the summer or winter season, respectively.

2/ District letters refer to the areas in which the fuels are sold (see fig. 1). In each item the arrangement of district letters indicates in decreasing order the relative volumes of distribution of the fuel. Fuels listed above the line separating items 262 and 183 are generally sold in greatest volume in the Central region. The fuels listed below the line are generally sold in lesser volumes in this region than in some other region.

3/ Viscosities reported in one term were converted to equivalent figures in the other as explained in the text. The Saybolt viscosity given in the average is the equivalent of the kinematic viscosity.

4/ Some of the determinations were made by the Conradson method, ASTM D189-54, and the data were converted to Ramsbottom values using table 1 and figure 4 in the appendix of the Conradson method.

5/ Corrosion test results are given separately for the two temperatures by number according to ASTM D130-55T.

6/ Distillation figures have been converted, where necessary, to temperatures at 760 mm. Hg according to table 1 in ASTM D86-54.

7/ Color by Saybolt chromometer, ASTM D156-53T.

8/ Calculated Cetane Index from chart in appendix 2 of ASTM D975-53T.

9/ Determined by lamp method, ASTM D1266-55T.

10/ Result of test on 100 percent sample. Not included in average.

TABLE 5.--Analyses of grade 2-D diesel fuel oils, 1956 (Cont.)

Item	Marketed as: Diesel fuel oil, class 1/	Marketed as: Burner fuel oil ASTM D396 Grade	Distributed in districts 2/	Gravity ASTM D287 ° API	Flash point ASTM D93 ° F.	Color Union ASTM D155 No.	Viscosity at 100° F. 3/ Kinematic ASTM D445 Cs.	Viscosity at 100° F. 3/ Saybolt ASTM D88 Sec.	Cloud test ASTM D97 ° F.	Pour point ASTM D97 ° F.	Sulfur content ASTM D129 percent	Aniline point ASTM D611 ° F.	Carbon Res. 4/ ASTM D524 On 10% Res., %	Corrosion ASTM D130 5/ 3 hours at 122° F. and 212° F.	Ash ASTM D482 percent	Cetane number ASTM D613	Distillation 6/ ASTM D158 Temperature ° F. IPB	% recovered 10	% recovered 50	% recovered 90	End point
Rocky Mountain region: Districts H, I, J, and K																					
263	2	-	H	35.2	195	1	3.99	39.1	14	5	7/1.06	158	0.05	1,1	< 0.001	55.0	430	503	550	609	661
264	2(S)	2	H	36.3	170	1	3.30	37.0	4	0	.808	152	.05	1,1	< .001	54.9	369	463	540	608	656
265	3(S)	-	H	37.6	155	1	3.27	36.9	2	-5	.636	156	.04	1,1	< .001	55.1	359	451	512	591	652
266	3(W)	-	H	38.8	156	1	2.52	34.5	-10	-20	.600	149	.04	1,1	< .001	53.2	375	435	491	570	629
267	3(S)	2	H	35.8	162	1	2.65	34.9	-2	-5	.79	-	.145	-,1	-	8/48.2	364	419	505	595	628
268	1	1	H	39.5	9/158	< 1	2.19	33.3	-4	-5	10/.379	149	.10	1a, -	.007	51	358	396	460	566	644
269	2	2	H	36.2	176	< 1½	3.69	38.2	12	10	10/.498	158	.10	1a, -	.009	55	408	444	524	606	672
270	2, 3(W)	-	H, I, L, K	37.0	160	< 1	2.68	35	-5	-15	.35	146.2	.08	1,1	.000	50.5	365	435	500	590	650
271	2, 3(S)	-	H, I, L, K	36.0	170	< 1	3.30	37	5	-5	.40	147.4	.08	1,1	.000	51.0	375	450	515	600	665
272	2, 3(W)	-	H, I, L, K	35.5	170	< 1	3.30	37	0	-10	.40	147.4	.08	1,1	.000	51.0	380	450	530	605	665
273	2, 3(S)	-	H, I, L, K	34.0	180	< 1	3.95	39	15	5	.42	149.5	.09	1,1	.000	51.5	390	480	550	615	670
274	1, 2, 3	-	H, L	39.8	156	1½	2.11	33.0	-18	-25	10/.390	147.0	.08	1,1	.001	8/50.6	356	408	469	562	628
275	2, 3	-	H, L	36.1	154	3½	2.71	35.1	-2	-15	10/.593	148.3	.07	1,1	.001	8/49.2	342	426	507	618	699
276	2(S)	2	H, L, F, I, K	36.3	170	1	2.80	35.4	-12	-10	.35	-	.090	-,1	-	8/52.4	387	447	525	603	635
277	3	-	I	33.8	176	1½	2.65	35.0	6	0	.722	140.5	.13	1,1	.000	8/43.5	392	450	502	594	652
278	3	2	I, G	33.5	155	1	3.18	36.6	-	0	.10	140.0	< .06	1a, 1a	.010	47.0	364	454	521	601	647
279	1, 2	-	I, G, H, F	36.1	145	1	2.90	35.7	-	-5	.085	148.0	< .06	1a, 1a	.001	51.5	352	441	512	584	637
280	3	-	I, H	33.1	168	2	2.63	34.8	8	0	.731	135.0	.09	1,1	.000	8/41.4	384	443	498	596	652
281	2, 3, 1	2	I, H	35.7	185	1½	2.46	34.3	-10	-15	.618	140.5	.11	-, 1a	.000	8/44.2	410	444	482	568	637
282	3, 2, 1	-	I, H	36.9	180	1½	2.93	35.8	-10	-10	.472	153.7	-	-, 1a	.005	8/51.0	406	450	508	586	637
283	2, 3	-	J	35.8	200	1	3.63	38.0	15	10	.26	160.2	.04	-,1	.001	51	416	465	524	608	666
284	3	-	J	28.6	200	2	3.79	38.5	20	15	.54	130.1	.08	-,1	.001	40	430	478	540	620	670
285	3	-	J	31.1	200	2	3.67	38.1	15	15	.45	140.4	.08	-,1	.001	43	414	475	530	610	668
286	3	-	J	32.8	162	1	3.4	37.3	5	-10	.58	129	.09	1, -	.005	8/40.2	388	440	494	580	638
287	2	2	J, G	37.6	175	1	3.3	37.0	5	-5	.37	154	.08	1, -	.005	8/52.5	396	446	508	588	652
288	3	-	J, G, I	30.9	195	1½	2.62	34.7	0	-5	.67	121	.09	1, -	.006	41.3	422	451	501	584	665
289	2, 3	2	J, G, I	34.5	195	2½	2.99	36.0	5	-10	.59	143	.07	1, -	.002	48.6	429	457	516	607	653
290	1, 2	2	K, L	35.7	160	< 1	2.87	35.6	0	-5	.49	150	.07	1,1	.002	50.1	359	444	519	586	634
291	3	-	K, L	32.1	176	< 1	2.62	34.8	2	-15	.65	124	.07	1,1	.002	40.8	379	450	502	576	630
292	2, 3(S)	2	K, L, M	33.0	184	1	3.65	38.1	6	10	.63	154.0	.09	-,1	.00	47.0	397	487	547	617	675
293	2, 3(W)	2	K, L, M	37.8	166	1	2.75	35.1	2	-10	.49	149.0	.09	-,1	.00	49.0	361	443	508	571	628
223	3	-	D, G, J	37.2	162	> 1	2.94	35.8	10	0	.32	156.5	.1	1,1	.000	55.1	352	422	518	606	668
236	2, 3, 1	2	F, H, E	35.2	143	1	2.77	35.3	-	0	.352	-	.06	1a, 1a	-	47.0	334	408	514	598	648
237	3, 2, 1	-	F, H, E	38.8	154	< 1	2.71	35.1	-4	-5	.216	-	< .06	1a, 1a	-	52	364	410	480	575	644
259	1, 2	-	G, F, E, J	38.4	200	< 1	3.15	36.5	0	-5	.17	166.6	.12	-,1	.002	55.6	422	478	520	580	632
260	2, 3	-	G, I	39.8	160	3	2.55	34.6	12	5	.20	152	.08	1,1	.001	50	360	394	462	608	670
261	2, 4	-	G, I	35.0	175	5	4.58	41.0	25	15	.31	154	.11	1,1	.002	52	400	450	560	620	670
262	3	-	G, I	32.8	180	< 1½	2.87	35.6	0	0	.490	136	.10	-	-	40	400	459	513	587	634
299	2(W)	2	M, L, K	33.6	178	2½	3.36	37.2	8	-5	.62	144	.11	-,1	.001	47	406	464	521	596	679
303	2(S)	2	M, N, L, K	32.9	180	3	4.14	39.6	-	20	.47	153	-	-,1	.001	48	420	482	550	635	683
302	2(W)	2	M, N, L, K	35.6	176	1½	3.24	36.8	-	5	.43	154	-	-,1	.001	50	392	455	520	616	671
Average (41 samples)				35.4	-	-	3.09	36.3	-	-	0.480	146.9	0.083	-	0.002	49.0	386	447	513	596	654
Minimum				28.6	143	< 1	2.11	33.0	-18	-25	0.085	121	0.04	-	0.000	37.6	334	394	460	562	628
Maximum				39.8	200	5	4.58	41.0	25	20	1.06	166.6	.145	-	.010	56.3	430	503	560	635	699

Western region: Districts L, M, and N

294	2, 3	2	L, M	36.5	160	1½	3.3	37	15	5	0.65	150	0.10	-, 1	<0.01	50	357	430	520	615	665
295	3	2	L, M, N	34.7	168	2	2.71	35.1	-	5	.49	-	-	-, 1	.001	46	372	442	502	590	685
296	2, 3, 4(S)	2	L, N, M	31.8	176	3½	3.80	38.5	2	0	.42	141.0	.08	-, 1	.00	44.0	360	456	530	606	660
297	2, 3, 4(W)	2	L, N, M	32.4	168	< 3	3.47	37.5	6	-5	.35	139.0	.08	-, 1	.00	44.0	366	450	526	600	662
298	2	2	M, L	32.2	192	1½	3.61	38.0	16	15	[10] .354	145	.13	1a, -	.004	48	410	467	548	629	666
299	2(W)	2	M, L, K	33.6	178	2½	3.36	37.2	8	-5	.62	144	.11	-, 1	.001	47	406	464	521	596	679
300	2, 3	2	M, L, N	31.0	180	2½	3.5	37.5	15	0	.40	145	.20	-, 1	< .01	40	385	450	530	650	715
301	2	2	M, N	33.4	194	1½	4.21	39.8	26	25	[10] .267	162	.09	1a, -	< .01	51	392	486	556	636	694
302	2(W)	2	M, N, L, K	35.6	176	1½	3.24	36.8	-	5	.43	154	-	-, 1	.001	50	392	455	520	616	671
303	2(S)	2	M, N, L, K	32.9	180	3	4.14	39.6	-	20	.47	153	-	-, 1	.001	48	420	482	550	635	683
304	2, 3(S)	2	N	33.9	166	2½	2.95	35.9	10	0	.42	140.5	.11	-, 1	.00	44.0	378	434	508	600	664
305	2, 3(W)	2	N	33.6	164	2	3.10	36.3	2	-10	.40	140.0	.09	-, 1	.00	43.0	380	432	506	605	676
306	2	2	N	32	230	3	4.3	40	10	5	.65	155	.10	1, -	.004	48	460	490	560	625	684
307	2	-	N	34	210	3	3.6	39	10	0	.60	148	.10	1, -	.004	47	395	460	520	610	675
308	2	-	N[11]	30.5	200	4	4.15	39.5	-6	0	.92	137	.06	-	.00	42.0	412	475	540	616	673
309	2, 3, 4(S)	2	N, L	32.5	176	< 4	3.95	39.0	8	5	.79	145	.09	-, 1	.00	46.0	382	472	552	622	672
310	2, 3, 4(W)	2	N, L	32.2	178	< 4	3.65	38.0	10	0	.71	142	.11	-, 1	.00	45.5	368	460	537	604	654
311	2	2	N, L	32.5	178	4	3.59	37.9	6	0	[10] .808	143	.12	1a, -	.008	45	360	463	532	611	664
312	3	-	N, L	29.9	178	< 3½	3.32	37.1	2	-10	.590	130	.11	1a, 1a	< .001	[7] 39	380	462	531	620	686
313	2, 3	2	N, L, M	33.0	190	2	3.3	37	15	5	.90	145	.20	-, 1	< .01	44	410	455	520	625	700
314	2	2	N, M, L	32.4	170	< 2½	3.64	38.1	8	0	.540	141	.10	1a, 1a	< .001	43	378	456	540	632	694
315	2, 3	-	N, M, L	36.1	188	2½	3.30	37.0	8	-5	.56	149.5	.13	1, 1	< .001	48	410	440	493	590	684
316	3	-	N, M, L	26.9	210	3	2.99	36.0	2	0	1.00	112.8	.35	1, 1	< .001	[7] 32	436	472	513	586	660
250	3(S)	-	G, E, L	31.2	172	2	2.32	33.8	0	-10	[10] .204	119.1	.22	1a, 1a	.001	[8] 34.7	400	447	478	552	636
251	3(W)	-	G, E, L	28.9	170	2	2.72	35.1	10	-5	[10] .130	118.7	.11	1a, 1a	.000	[8] 34.3	418	470	504	585	664
270	2, 3(W)	-	H, I, L, K	37.0	160	< 1	2.68	35	-5	-15	.35	146.2	.08	1, 1	.000	50.5	365	435	500	590	650
271	2, 3(S)	-	H, I, L, K	36.0	170	< 1	3.30	37	5	-5	.40	147.4	.08	1, 1	.000	51.0	375	450	515	600	665
272	2, 3(W)	-	H, I, L, K	35.5	170	< 1	3.30	37	0	-10	.40	147.4	.08	1, 1	.000	51.0	380	450	530	605	665
273	2, 3(S)	-	H, I, L, K	34.0	180	< 1	3.95	39	15	5	.42	149.5	.09	1, 1	.000	51.5	390	480	550	615	670
274	1, 2, 3	-	H, L	39.8	156	1½	2.11	33.0	-18	-25	[10] .390	147.0	.08	1, 1	.001	[8] 50.6	356	408	469	562	628
275	2, 3	-	H, L	36.1	154	3½	2.71	35.1	-2	-15	[10] .593	148.3	.07	1, 1	.001	[8] 49.2	342	426	507	618	699
276	2(S)	2	H, L, F, I, K	36.3	170	1	2.80	35.4	-12	-10	.35	-	.090	-, 1	-	[8] 52.4	387	447	525	603	635
290	1, 2	2	K, L	35.7	160	< 1	2.87	35.6	0	-5	.49	150	.07	1, 1	.002	50.1	359	444	519	586	634
291	3	-	K, L	32.1	176	< 1	2.62	34.8	2	-15	.65	124	.07	1, 1	.002	40.8	379	450	502	576	630
292	2, 3(S)	2	K, L, M	33.0	184	1	3.65	38.1	6	10	.63	154.0	.09	-, 1	.00	47.0	397	487	547	617	675
293	2, 3(W)	2	K, L, M	37.8	166	1	2.75	35.1	2	-10	.49	149.0	.09	-, 1	.00	49.0	361	443	508	571	628
Average (36 samples)				33.5	-	-	3.30	37.0	-	-	0.523	143.0	0.112	-	0.001	45.7	387	455	522	606	668
Minimum				26.9	154	< 1	2.11	33.0	-18	-25	0.130	112.8	0.06	-	0.000	32	342	408	469	552	628
Maximum				39.8	230	4	4.3	40	26	25	1.00	162	.35	-	.008	52.4	460	490	560	650	715

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[1] Classes 1, 2, 3, and 4 of diesel fuel oils are described in the text. (S) or (W) indicates the fuel is recommended for use only during the summer or winter season, respectively.

[2] District letters refer to the areas in which the fuels are sold (see fig. 1). In each items the arrangement of district letters indicates in decreasing order the relative volumes of distribution of the fuel. Fuels listed above the line separating items 293 and 223 are generally sold in greatest volume in the Rocky Mountain region. The fuels listed above the line separating items 316 and 250 are generally sold in greatest volume in the Western region. The fuels listed below the lines are generally sold in lesser volumes in the two respective regions than in some other region.

[3] Viscosities reported in one term were converted to equivalent figures in the other, as explained in the text. The Saybolt viscosity given in the averages is the equivalent of the kinematic viscosity average.

[4] Some of the determinations were made by the Conradson method, ASTM D189-54, and the data were converted to Ramsbottom values using table 1 and figure 4 in the appendix of the Conradson method.

[5] Corrosion test results are shown separately for the two temperatures by number according to ASTM D130-55T.

[6] Distillation figures have been converted, where necessary, to temperatures at 760 mm. Hg according to table 1 in ASTM D86-54.

[7] Does not meet the requirements of fuels of this grade.

[8] Calculated Cetane Index from chart in appendix 2 of ASTM D975-53T.

[9] Flash point by Tag closed tester, ASTM D56-52.

[10] Determined by lamp method, ASTM D90-55T or ASTM D1266-55T.

[11] Sold at large marine terminals only.

TABLE 6.--Analyses of grade 4-D diesel fuel oils, 1956

Item	Marketed as		Distributed in districts 2/	Gravity	Flash point	Color	Viscosity at 100° F. 3/		Cloud test	Pour point	Sulfur content	Aniline point	Carbon residue Ramsbottom 4/ ASTM D524		Corrosion ASTM D130 5/	Ash	Cetane number	Distillation 6/ ASTM D158 Temperature ° F.				
	Diesel fuel oil, class 1/	Burner fuel oil ASTM D396 Grade		ASTM D287 °API	ASTM D93 ° F.	Union ASTM D155 No.	Kinematic ASTM D445 Cs.	Saybolt ASTM D88 Sec.	ASTM D97 °F.	ASTM D97 °F.	ASTM D129 percent	ASTM D611 °F.	On 10% residue, %	On 100% sample, %	3 hours at 122° F. and 212° F.	ASTM D482 percent	ASTM D613	IBP	% recovered 10	50	90	End point
Eastern region: Districts A, B, and C.																						
317	4	-	B	22.5	220	(Green)	5.83	45.0	-	-10	0.39	120.0	-	0.47	1,1	0.002	7/28	8/402	475	560	770	888
318	4	-	B	28.6	156	-	7/5.20	7/43	-	-20	1.00	-	-	.07	-	.000	38.0	-	-	-	-	-
319	3, 4	2	C, E	28.3	273	3	7.83	51.5	44	40	.25	161.6	-	.143	1a, 1a	.000	60	560	602	636	672	708
325	4	-	D, B	33.0	240	(Dark)	5.92	45.3	-	-15	.18	157.5	-	.98	1,1	.010	59	462	512	574	698	744
326	4	-	D, B	31.6	170	(Dark)	6.68	47.8	-	0	.12	163.8	-	.85	1,1	.002	51	378	453	558	739	-
Average (5 samples)				28.8	-	-	6.29	46.5	-	-	0.39	150.7	-	0.50	-	0.003	47.2	451	511	582	720	780
Minimum				22.5	156	-	5.20	43	-	-20	0.12	120.0	-	0.07	-	0.000	28	378	453	558	672	708
Maximum				33.0	273	-	7.83	51.5	-	40	1.00	163.8	-	.98	-	.010	60	560	602	636	770	888
Southern region: District D																						
320	4	-	D	30.0	>200	-	7/4.89	7/42	-	-	0.6	-	-	0.6	-	<0.02	-	-	-	-	-	-
321	4	-	D	30.0	170	-	5.8	45	-	-	.4	-	-	.6	-	.01	-	-	-	-	-	-
322	4	-	D	30.2	206	(Green)	7/4.89	7/42.0	-	0	.19	152.2	-	.32	1,1	.001	45	8/338	478	570	696	812
323	3, 4	-	D	26.8	230	2½	5.8	45.0	20	10	.30	156	0.12	.01	1,3	.001	40.0	410	500	610	690	>760
324	4	-	D	29.5	180	-	7/5.20	7/43.0	-	10	.52	-	-	.53	-	.001	46.0	-	-	-	-	-
325	4	-	D, B	33.0	240	(Dark)	5.92	45.3	-	−15	.18	157.5	-	.98	1,1	.010	59	462	512	574	698	744
326	4	-	D, B	31.6	170	(Dark)	6.68	47.8	-	0	.12	163.8	-	.85	1,1	.002	51	378	453	558	739	-
Average (7 samples)				30.2	-	-	5.60	44.3	-	-	0.33	157.4	-	0.56	-	0.006	48.2	397	486	578	706	772
Minimum				26.8	170	-	4.89	42.0	-	-15	0.12	152.2	-	0.01	-	0.001	40.0	338	453	558	690	744
Maximum				33.0	240	-	6.68	47.8	-	10	.6	163.8	-	.98	-	.02	59	462	512	610	739	812
Central region: Districts E, F, and G																						
319	3, 4	2	C, E	28.3	273	3	7.83	51.5	44	40	0.25	161.6	-	0.143	1a, 1a	0.000	60	560	602	636	672	708
Rocky Mountain region: Districts H, I, J, and K (no representation)																						
Western region: Districts L, M, and N																						
327	4	-	N 9/	17.4	174	-	56.9	264.0	-	10	1.82	115	-	5.3	-	0.02	-	362	455	654	-	-
328	4	-	N 9/	17.4	194	(Black)	64.0	296.7	-	-35	.97	123	-	6.1	-	.04	-	8/(10)	463	602	-	1025
329	4	-	N	27.1	200		9.4	57	-	10	1.10	-	-	1.1	-	<.01	-	-	-	-	-	-
Average (3 samples)				20.6	-	-	43.4	201.7	-	-	1.30	119	-	4.17	-	0.023	-	-	459	628	-	-
Minimum				17.4	174	-	9.4	57	-	-35	0.97	115	-	1.1	-	<0.01	-	-	455	602	-	-
Maximum				27.1	200	-	64.0	296.7	-	10	1.82	123	-	6.1	-	.04	-	-	463	654	-	-

1/ Classes 3 and 4 of diesel fuel oils are described in the text.

2/ District letters refer to the areas in which the fuels are sold (see fig. 1). In each item the arrangement of district letters indicates in decreasing order the relative volumes of distribution of the fuel. Fuels listed above the line separating items 319 and 325 are generally sold in greatest volume in the Eastern region. The fuel listed below the line - item 319 in the Central region - is sold in lesser volume than in the Eastern region.

3/ Viscosities reported in one term were converted to equivalent figures in the other, where possible, as explained in the text. The Saybolt viscosity given in the average is the equivalent of the kinematic viscosity average.

4/ Some of the determinations were made by the Conradson method, ASTM D189-54, and the data were converted to Ramsbottom values using table 1 and figure 4 in the appendix of the Conradson method.

5/ Corrosion test results are shown by number according to ASTM D130-55T.

6/ Distillation figures have been converted, where necessary, to temperatures at 760 mm. Hg according to table 1 in ASTM D86-54.

7/ Does not meet the requirement of fuels of this grade.

8/ Distillation temperatures are equivalent values at 760 mm. Hg converted from temperatures at reduced pressure according to the chart (fig. 5) in the report by Beale, E. S. L. and Docksey, P., A Wide Range Boiling-Point Conversion Chart for Hydrocarbons and Petroleum Products: Jour. Inst. Petrol. Technol., Vol. 21, 1935, pp. 860-870. Also figure 25 (p. 1,588) Science of Petroleum, Vol. 2, Oxford University Press, 1938.

9/ Sold at large marine terminals only.

10/ Initial boiling point not reported, temperature at 5 percent 450° F.